

GEOGRAPHY  
OF  
OKLAHOMA



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THE WASHITA RIVER GORGE

# Geography *of* Oklahoma

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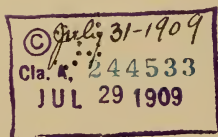
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## PREFACE.

Very little has been written on the geography of Oklahoma. At the time when this text was prepared, Oklahoma had been a state less than two years. Most county lines and county seats were established with statehood. While certain geographical features, such as rivers, mountains, rocks, and climate are permanent, others, like political boundaries, cities and government, often change rapidly. This is particularly true in a new state like ours. Since statehood a number of county seats have been changed and others will probably be changed before the book leaves the press.

For the most part, the subject matter of this volume is based on the writer's personal experience, gathered during the past fifteen years, while doing geological work in the various parts of the State. The work of other investigators has been consulted, however, where occasion required, particularly the publications of Mr. Joseph A. Taff of the United States Geological Survey, who has spent a number of years in eastern Oklahoma.

This book is intended primarily for students in the grades, although it is believed that until a more comprehensive text is written, the facts contained may be useful for the high school or even for more advanced work. The primary thought has constantly been kept in mind, however, that many people will never learn more of the geography of Oklahoma than is contained in this volume. For that reason, the attempt has been made to combine simplicity of style with briefness and accuracy of statement.

The greater part of the illustrations are from photographs taken by the author. Pierce Larkin and E. Z. Carpenter prepared the drawings.

CHARLES N. GOULD.

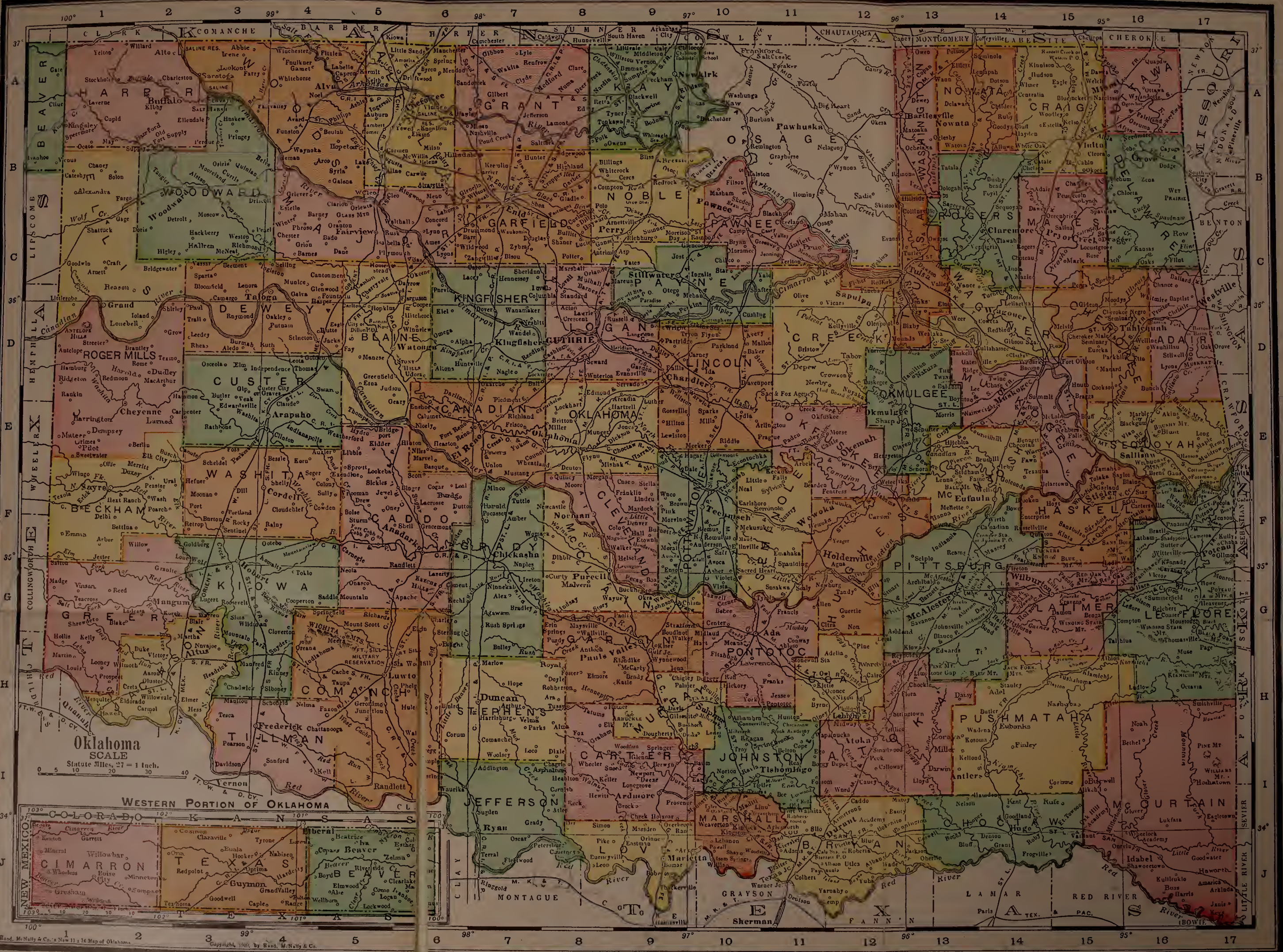
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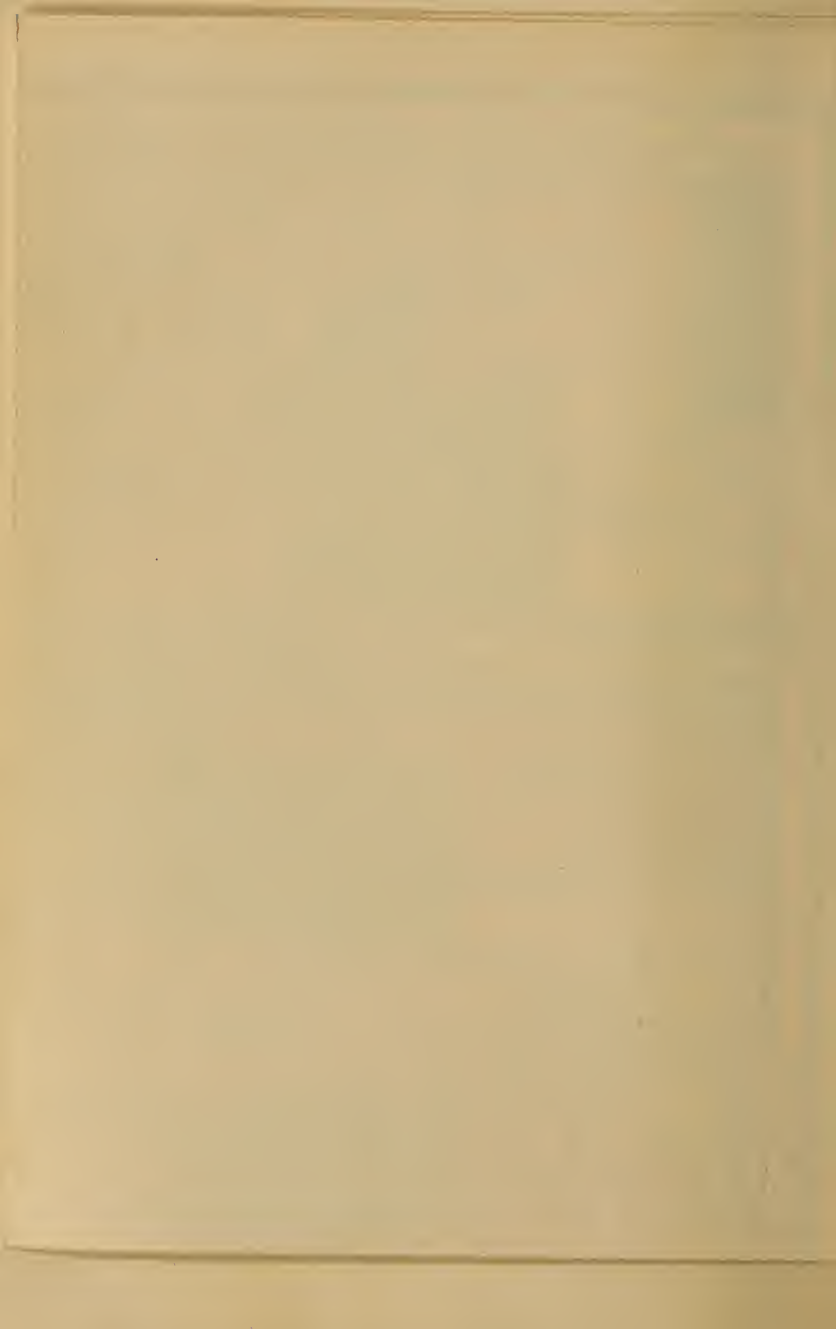












# CONTENTS

---

## CHAPTER I.

	Pages
LOCATION AND BOUNDARIES.—Location of Oklahoma, Boundaries, Area, Government Maps.....	1-4

## CHAPTER II.

TOPOGRAPHY.—The Great Plains, The Highest and Lowest Points, Topographic Regions, Ozark Mountains, Ouachita Mountains, Arbuckle Mountains, Wichita Mountains, Arkansas Valley Region, Red River Valley Region, Sandstone Hills Region, Redbeds Plains Region, Gypsum Hills Region, High Plains Region.....	5-24
--	------

## CHAPTER III.

GEOLOGY.—Kinds of Rocks, Geologic Periods, Sedimentary Rocks, Igneous Rocks, Oldest Rocks in Oklahoma, Origin of Arbuckle and Wichita Mountains, Carboniferous Rocks, The Mississippian, The Pennsylvanian, The Permian-Triassic and Jurassic Times, Cretaceous Rocks, Tertiary Rocks, Quaternary Rocks.....	25-42
--	-------

## CHAPTER IV.

UNDERGROUND WATER.—Disposal of Rainfall, Underground Water, Movement of Underground Water, Springs, Mineral Springs, Wells, Artesian Wells.....	43-49
---	-------

## CHAPTER V.

DRAINAGE.—Origin of Streams, Chief Streams of Oklahoma, Character of Oklahoma Streams, Drainage Basins, Arkansas River, Grand River, Verdigris River, Poteau River, South Canadian River, North Canadian River, Cimarron River, Salt Fork River, Washita River, Red River, Lakes .....	50-62
--	-------

CHAPTER VI.

	Pages
WEATHER AND CLIMATE.—Weather, Temperature, Air, Wind, Humidity, Precipitation, Weather Bureau, Cyclones, Climate, Temperature, Humidity, Rainfall, Oklahoma Climate .....	63-72

CHAPTER VII.

VEGETATION AND ANIMAL LIFE.—Flora and Fauna, Flora of Oklahoma, Trees, Grasses, Mistletoe, Fauna of Oklahoma, Wild Animals, Birds, Snakes and Lizards, Turtles, Do-not-kill Snakes, Fishes .....	73-82
--	-------

CHAPTER VIII.

LOCATION OF INDIAN TRIBES.—Original Owners of Oklahoma, Homes of the Five Civilized Tribes, Migration of Five Civilized Tribes, Settlement of Friendly Indians in Oklahoma, Mode of Life .....	83-90
--	-------

CHAPTER IX.

EARLY HISTORY AND SETTLEMENT.—Old Oklahoma, Agitation Leading to the Opening of Oklahoma to Settlement, Opening of Oklahoma, No Man's Land, Other Reservations, The Cherokee Strip, Greer County, The Kiowa Country, Indian Territory, Work of Dawes Commission, Admission of Oklahoma, Character of Settlers.....	91-101
--	--------

CHAPTER X.

EDUCATION.—Free Education, School Laws, State Superintendent, Country Schools, City Schools, State Schools, Church Schools, Religious Denominations.....	101-107
--	---------

CHAPTER XI.

GOVERNMENT.—Constitution, Legislative Department, Executive Department, Judicial Department, Local Government .....	108-111
---	---------

CHAPTER XII.

Pages

AGRICULTURAL RESOURCES.—Soil Areas, Residual Soil, Trans-  
ported Soil, Corn, Wheat, Oats and Other Small Grain,  
Broom Corn, Cotton, Alfalfa, Prairie Hay, Fruits, Po-  
tatoes, Vegetables, Minor Crops, Stock Raising, Cattle,  
Horses, Hogs, Dairying, Poultry, The Farmer's Need..112-125

CHAPTER XIII.

MINERAL RESOURCES.—Variety of Minerals in Oklahoma, The  
Fuels, Coal, Oil, Gas, Asphalt, Salt, Gypsum, Lead and  
Zinc, Building Stone, Clay, Sand.....126-143

CHAPTER XIV.

MANUFACTURES.—Need of Factories, Clay Products, Port-  
land Cement, Gypsum Plaster, Flour and Oil Mills,  
Other Manufacturing Plants, Future of Manufacturing  
Industries of Oklahoma.....144-149

CHAPTER XV.

COMMERCE.—Land and Water Transportation, Oklahoma  
Rivers, Railroads .....150-153

CHAPTER XVI.

PUBLIC LAND SURVEYS.—Initial Point, Principal Meridian  
and Range Lines, Base Line and Township Lines, Con-  
gressional Township, Sections, Corner Stones, Cimarron  
Meridian .....154-160

CHAPTER XVII.

POPULATION, CITIES AND COUNTIES.—Population and Emmi-  
gration, Growth of Cities, Oklahoma Cities, Oklahoma  
City, Muskogee, Guthrie, Shawnee, Enid, Ardmore, Mc-  
Alester, Chickasha, Tulsa, Lawton, El Reno, Durant,  
Sapulpa, Bartlesville, Ada, Vinita, Norman, Stillwater,  
Alva, Edmond, Weatherford, Counties.....161-173  
PRONOUNCING VOCABULARY .....174-175  
INDEX ..... 176



# LIST OF ILLUSTRATIONS

	The Washita River Gorge .....	Frontispiece
FIG.		PAGE
1.	Products Grown on a Single Farm in Oklahoma.....	1
2.	Topographers at Work in the Field.....	3
3.	Topographic Regions of Oklahoma.....	7
4.	Spring and Milkhouse in Eastern Oklahoma.....	8
5.	Rocks on Edge.....	10
6.	Turner Falls at a Distance of One Mile.....	11
7.	Near View of Turner Falls.....	12
8.	The Washita Gorge Showing Rock Crusher.....	13
9.	Rock Cut the R. R. Blasted Out of the Rocks.....	14
10.	Saddle Mountain .....	15
11.	Gypsum Hills, Blaine County .....	20
12.	Lake on High Plains.....	22
13.	Fossil Crinoid Stems .....	25
14.	Fossil Camarocrinus .....	26
15.	Conglomerate Rock .....	27
16.	Boulders of Oklahoma Granite near Tishomingo.....	29
17.	Limestone on Edge, Oil Creek, Oklahoma.....	30
18.	Three Views of White Mound near Dougherty, Oklahoma	32
19.	Camp of Geology Students in the Arbuckle Mountains....	33
20.	Folded Rocks .....	34
21.	Rocks on Edge .....	35
22.	Price's Falls, Arbuckle Mountains .....	36
23.	Cross-section of the Arbuckle Mountains Before Erosion..	37
24.	Cross-section of the Arbuckle Mountains at the Present Time .....	37
25.	Spring at Old Fort Arbuckle.....	45
	Wall Built in 1852.	
26.	Mineral Springs at Bromide .....	46
27.	Well Drilling Machine .....	47
28.	An Artesian Well at Lehigh.....	48
29.	Maps Showing the Drainage Basins of Oklahoma.....	52
30.	Valley of the Arkansas River in Kay County.....	53
31.	A Team Crossing the Canadian River in a Flood.....	56
32.	The Cimarron River, Showing Low Sandy Banks.....	58

FIG.	PAGE
33. Limestone in Washita Gorge .....	59
34. View on Little River, Eastern Oklahoma.....	60
35. Ferry Boat on Kiamitia River .....	61
36. An Artificial Lake near Newkirk.....	61
37. A Cyclonic Area Crossing Oklahoma.....	66
38. Chart Showing the Monthly Temperature of Oklahoma..	68
39. Chart Showing the Mean Annual Precipitation of Ok- lahoma. ....	69
40. Chart Showing the Average Monthly Rainfall in Okla- homa .....	70
41. Upland Timber in Eastern Oklahoma.....	74
42. A Sawmill in Eastern Oklahoma.....	75
43. Piles of Cross Ties and Lumber at Bennington.....	76
44. Rail Fence and Deadened Timber.....	77
45. A Dwarf Elm on the High Plains.....	78
46. Cottonwood and Elm Timber along a Stream in Western Oklahoma .....	79
47. Buffalo Herd in the Forest Reserve in the Wichita Mountains .....	80
48. A Map Showing the Location of Indian Tribes in Ok- lahoma Before the Settlement of the Whites.....	85
49. Wichita Grass Houses .....	86
50. Sac and Fox Bark Houses .....	87
51. Conical Tepees of the Comanches.....	88
52. Indian Papoose .....	89
53. The Opening of Oklahoma.....	92
54. Indian Cabin in Eastern Oklahoma.....	96
55. Indian Cabin in the Timber.....	97
56. Sod House in Western Oklahoma.....	98
57. A Claim Shanty in Western Oklahoma.....	99
58. Breaking Ground in the Timbered Country.....	100
59. Modern Oklahoma Farm House.....	100
60. Stone School House in Kay County.....	103
61. Science Hall, State University.....	104
62. Buildings at the A. & M. College.....	105
63. Corn Awaiting Market .....	113
64. Wheat Raising in Oklahoma.....	114
65. Threshing Wheat in Northern Oklahoma.....	115
66. Hauling Broom Corn to Market.....	116
67. Cotton Going to Market.....	116
68. A Train Load of Cotton.....	119
69. Cotton Baled on Board Cars.....	119
70. A Fruit Farm in Central Oklahoma.....	120
71. Cattle on the Plains.....	122
72. Map Showing the Mineral Products of Oklahoma.....	127
73. A Coal Mine at Midway.....	128



# LIST OF ILLUSTRATIONS

xiii

FIG.	PAGE
74. Coal Mine at Lehigh .....	129
75. Oil Well Derricks at Cleveland.....	130
76. Oil Gushing from a New Well.....	131
77. A Tank Farm Near Copan.....	132
78. A Train Load of Oil Leaving Bartlesville.....	133
79. An Asphalt Mill and Mine Near Sulphur.....	134
80. Streets of Ardmore Paved with Oklahoma Asphalt.....	135
81. Salt Plains of Alfalfa County near Cherokee.....	136
82. Zinc Mines near Miami.....	137
83. Two Views Showing the Effect of a Blast in a Lime- stone Quarry at Crusher, Oklahoma.....	139
84. Limestone Posts in Kay County.....	140
85. Pioneer Telephone Building in Oklahoma, Built of Ok- lahoma Marble .....	141
86. Ledge of Glass Sand at Bromide.....	142
87. Portland Cement Mill at Dewey, Oklahoma.....	145
88. Gypsum Ledges in Western Oklahoma.....	146
89. Cotton Oil Mill at Madill.....	147
90. Interior of a Cotton Mill at Guthrie.....	148
91. Zinc Smelter at Bartlesville.....	148
92. Diagram of a Township Showing Each of the Subdi- visions .....	156
93. Diagram Showing How a Section May Be Divided.....	157
94. A Modern Office Building at Oklahoma City.....	163
95. Court House at Oklahoma City.....	164
96. Masonic Temple at McAlester.....	165
97. Busby Hotel at McAlester.....	166
98. Smoke from Burning Oil.....	167
99. A Bird's Eye View of Sapulpa Showing Burning Oil in the Distance .....	168



# GEOGRAPHY OF OKLAHOMA

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## CHAPTER I.

### LOCATION AND BOUNDARIES.

**Location of Oklahoma.** Oklahoma is situated a little south of the center of the United States. Oklahoma City, which is not far from the center of Oklahoma, is about 200 miles south of the geographical center of the nation. It is about 450 miles north of the Gulf of Mexico, 800 miles south of Canada, 1,300 miles from New York and almost an equal distance from San Francisco.

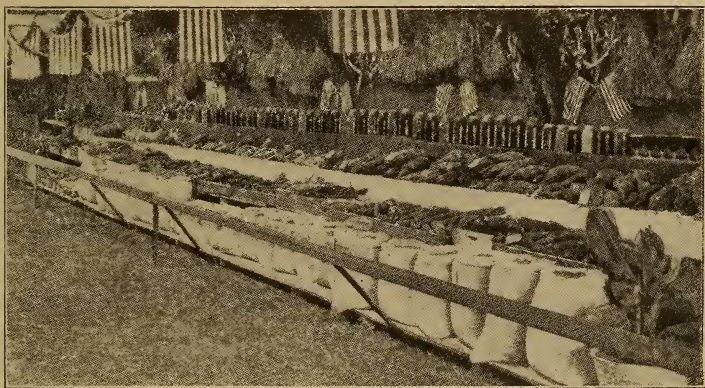


FIG. 1. PRODUCTS GROWN ON A SINGLE FARM IN OKLAHOMA

Although on regional maps of the United States Oklahoma is classed as the most northwestern of the southern states, there is no state in the Union which combines greater variety of soil, climate, crops, and inhabitants. Upon a single farm can be seen products that grow in the states from Minnesota to Florida and from Maine to California. (Figure 1 shows the products grown on a single farm.) In character of inhabitants and variety of crops and industries the southern part of Oklahoma resembles the southern states; northern Oklahoma is in the same class with such states as Kansas, Iowa, and Illinois; western Oklahoma has all the characteristics of a far western state.

**Boundaries.** The boundaries of Oklahoma have been determined by the boundaries of the older states which touch it. Red River on the south, which separates Oklahoma from Texas, is the only natural boundary. Three straight lines form the eastern boundary and mark off Oklahoma from Missouri and Arkansas. The line between Oklahoma and Missouri was originally drawn from the mouth of the Kansas River at Kansas City south to the parallel of  $36^{\circ} 30'$ . The line from the Arkansas River south to Red River was drawn from a point 100 paces west of old Fort Smith, thus separating Arkansas from the old Choctaw Nation. The third straight line was drawn diagonally northwest and southeast from Fort Smith to the southwest corner of Missouri. The northern boundary of Oklahoma is formed by the 37th parallel of latitude, which is also the southern line of Kansas and Colorado. The extreme western line of the state lies in longitude  $103^{\circ}$  west and separates Oklahoma from New Mexico. The main part of the state, however, extends

only to the 100th meridian, the eastern line of the Panhandle of Texas. The southern line of the three western counties is the parallel of  $36^{\circ} 30'$ , the same as the southern line of Missouri.

**Area.** The greatest distance across the state is from east to west along the northern boundary, and measures 467 miles. The greatest distance from north to south along the eastern line is 230 miles. Oklahoma contains



FIG. 2. TOPOGRAPHERS AT WORK IN THE FIELD

about 70,430 square miles, or 45,075,200 acres of land--enough to make 381,720 farms of 160 acres each.

**Government Maps.** That part of Oklahoma which was formerly Indian Territory, as well as a part of the Territory of Oklahoma, has been surveyed and mapped by the United States Geological Survey. These maps have been carefully prepared and show all the streams, hills, and valleys, as well as the location of the roads, railroads, cities, and houses that were present when the map was made. These maps are known as topographic sheets and represent from 800 to 1,000 square miles each. (Figure 2 shows a party of students from the State Uni-

versity preparing topographic maps in the field.) The government maps may be purchased of the Director of the Survey, at Washington, for five cents each, or three dollars per hundred. Folios, which contain a geologic map showing the location of the various formations and the different valuable minerals, have been published of the Atoka, Coalgate, Tishomingo, Tahlequah and Muskogee sheets. The folios are sold for twenty-five cents each. A good county map of Oklahoma may be obtained by sending twelve cents to the Superintendent of Documents at Washington, D. C. These maps contain the very latest information on the subjects treated, and are sold practically at cost. Students are urged to purchase a state map and a topographic sheet of their home region.

#### QUESTIONS AND EXERCISES

1. Locate Oklahoma in the United States.
2. How far is Oklahoma from New York? From San Francisco? From Canada?
3. Bound Oklahoma.
4. What river forms the southern boundary of Oklahoma?
5. How were the three straight lines located which form the eastern boundary?
6. What parallel forms the northern boundary?
7. What two meridians form the western boundary?
8. What is the greatest distance across the State from east to west? From north to south?
9. What is the area of Oklahoma in square miles? In acres?
10. How many 160-acre farms would it contain?

## CHAPTER II.

### TOPOGRAPHY.

**The Great Plains.** Oklahoma is located in that part of the United States known as the Great Plains. The Great Plains slope from the Rocky Mountains on the west to the Mississippi River on the east. The Plains appear to be nearly level, but in fact near the mountains the elevation is more than a mile above the ocean.

**The Highest and Lowest Points.** The highest point in Oklahoma is on Black Mesa in the extreme northwestern corner of Cimarron County, the most western county in the state. Black Mesa is a flat-topped hill made up of black lava rock which was long ago poured out from a volcano. It is about 4,800 feet above sea level. From this point the surface of Oklahoma slopes gradually to the east. The average slope is about eight feet to the mile, which is so slight that one can hardly see that the country slopes at all.

The lowest points in the state are along the eastern line where the two largest rivers flow from Oklahoma into the state of Arkansas. The Arkansas River flows from Oklahoma at Fort Smith, and the Red River at the extreme southeast corner of the state. At these places the elevation above sea level is between 300 and 400 feet.

The greater part of Oklahoma consists of grass-covered "rolling prairie," with occasional ranges of hills trending usually north and south. In the southern and the



eastern parts of the state there are a number of ranges and groups of hills, some of which rise to the dignity of mountains. These hills and mountains are usually covered with timber. Between the hills are areas of rolling and level country, sometimes timbered, sometimes prairie.

**Topographic Regions.** The unevenness of land surfaces is called Relief, or Topography. A part of the country containing the same general forms of relief is called a Topographic Region. Oklahoma may be divided into the following ten Topographic Regions:

The Ozark Mountains.

The Ouachita Mountains.

The Arbuckle Mountains.

The Wichita Mountains.

The Arkansas Valley Region.

The Red River Valley Region.

The Sandstone Hills Region.

The Redbeds Plains Region.

The Gypsum Hills Region.

The High Plains Region.

It must be understood that there is no sharp line of division between these various regions in Oklahoma. In most instances one region grades insensibly into another, so that it is often impossible to say just where one region ends and another begins. For instance, the exact line of separation between the Arkansas Valley region and the Sandstone Hills region can not be determined. In studying the different regions turn to the topographic map, Figure 3, and locate each region.

**Ozark Mountains.** The Ozark Mountains of Oklahoma include only a small portion of this uplift which occupies a great part of southern Missouri. In northern



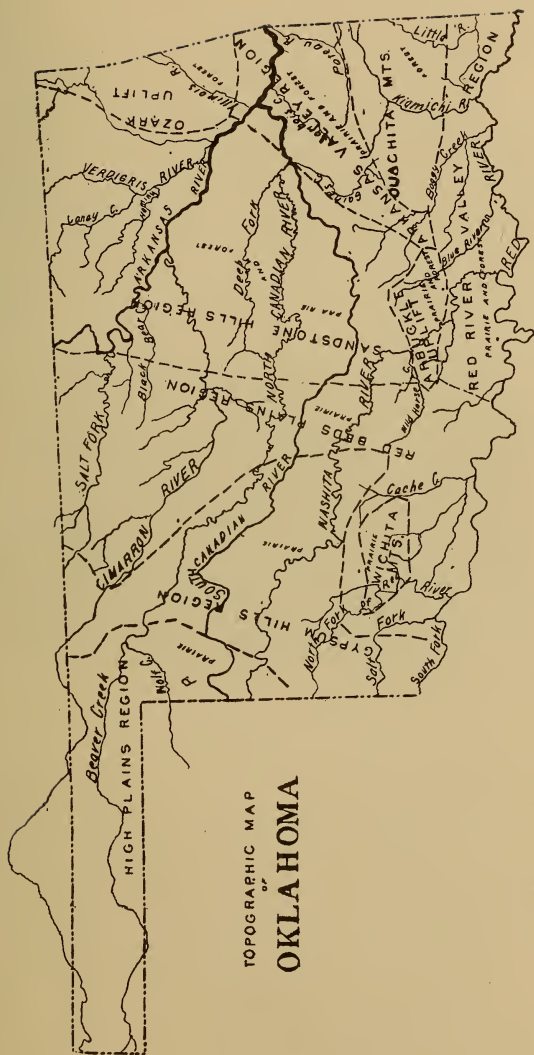


FIG. 3. TOPOGRAPHIC REGIONS OF OKLAHOMA

Arkansas the same range is known as the Boston Mountains. There are no very high peaks or ridges in these mountains, but the region is a high level table-land, covered with a floor of white limestone. This is the rock which contains the lead and zinc at Joplin in southern Missouri. The general level of this plateau in Oklahoma is about 600 feet above the lowlands, or about 1,100 feet above sea level. The Arkansas River flows south of the mountains and the Grand west of them. A



FIG. 4. SPRING AND MILKHOUSE IN EASTERN OKLAHOMA

number of small streams rise on the flat upland and flow south and west into the Arkansas or the Grand. The largest of the streams flowing south into the Arkansas are Lees Creek, Sallisaw Creek, Vian Creek, and the Illinois River. Those flowing west into the Grand are Clear, Spring, Saline and Spavinaw creeks. All these streams and their many branches have cut deep and narrow valleys in the mountains, forming steep and rocky cliffs and bluffs. Some of the finest scenery in Oklahoma is found along these valleys. The mountains are in most places

densely wooded. Oak, hickory, elm, walnut and persimmon trees are most common.

In the Ozark region there are thousands of springs. Some of the purest water in the United States comes from these springs. Tahlequah, the old Cherokee capital, is located on the site of strong springs and such towns as Wauhilla, Stilwell, and Westville all have fine springs. There is scarcely a farm house in the whole region that does not use spring water. (Figure 4 shows one of these springs and a milk house.) Eureka Springs, Siloam Springs, Electric Springs, and Monte Né are health resorts in Arkansas located by springs of the same kind as those in Oklahoma. Ottawa, Delaware, Adair, Cherokee and parts of Sequoyah, Mayes, and Craig counties are located in the Ozark Mountains. The largest towns are Tahlequah, Miami, Westville and Stilwell.

**Ouachita Mountains.** The name Ouachita (Wa-she-taw) Mountains is often used to include a number of chains and groups of mountains located in southeastern Oklahoma and southwestern Arkansas. The group of mountains as a whole extends from near Little Rock, Arkansas, westward nearly to Atoka, Oklahoma, a distance of about 200 miles. Only the western half of the group is in Oklahoma.

The Ouachita Mountains in Oklahoma consist of a great many long narrow ridges composed of sandstone standing on edge. These ridges are sometimes two thousand to three thousand feet above sea level. They lie parallel to each other, and usually extend northeast and southwest, and are separated by deep and narrow valleys. Some of the largest ridges of the Ouachitas are the Kiameitias, Black Fork, Seven Devils, Winding Stair, Pine, and

Jack Fork mountains. Poteau River flows across the northern part of the group and Mountain Fork, Little River, Glover Creek, Kiamitia River and McGee Creek rise in the mountains and flow south.

In general the mountains are well wooded, including some valuable forests of pine and oak. Some prairie land is found in the valleys. The Ouachitas in Oklahoma include southern LeFlore, Latimer and Pittsburg coun-



FIG. 5. ROCKS ON EDGE

ties, eastern Atoka and northern Pushmataha and McCurtain counties. There are no large towns in the mountains. This is the roughest part of Oklahoma and fewer people live here than in any other section of the State. The land is not suitable for agricultural purposes and has few mineral deposits.

**Arbuckle Mountains.** The Arbuckle uplift occupies an area 60 miles long and 20 miles wide in southern Oklahoma. Only that part of the uplift which lies west of

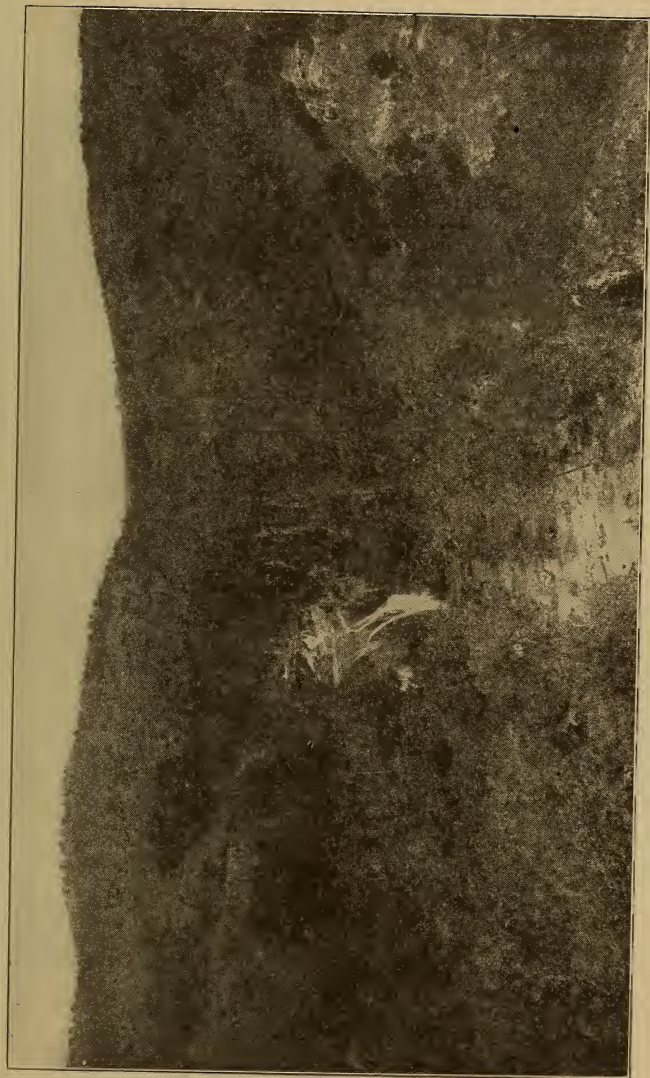


FIG. 6. TURNER FALLS FROM A DISTANCE OF ONE MILE





FIG. 7. NEAR VIEW OF TURNER FALLS

the Washita River is usually spoken of as the Arbuckle Mountains, but the name may well be applied to the entire range of rocky hills that extends as far east as Wapanucka. The rocks are largely massive ledges of limestone which have been upheaved, broken, folded and twisted until they are highly inclined, standing on edge as in Fig. 5. There are occasional peaks and rounded hills composed of granite. The granite is exposed in a



FIG. 8. THE WASHITA GORGE SHOWING ROCK CRUSHER.

large area north and northeast of Tishomingo, and in the East Timbered Hills and West Timbered Hills west of Washita River, southwest of Davis. The highest peaks are only 700 feet above the surrounding plain or 1,400 feet above sea level.

There are many strong flowing springs in the Arbuckles, and a number of picturesque waterfalls. Figs. 6 and 7 are two views of Turner Falls. Sulphur and Bromide are two health resorts which have grown up around mineral springs near the edge of the mountains. Such creeks as

Honey, Falls, Rock, Canyon, Pennington, Blue and Mill are fed largely by springs. The Washita River flows

across the mountains in a deep canyon which it has cut in the limestone rocks, as shown in Fig. 8. The Santa Fe Railroad follows the canyon of the Washita in a roadbed blasted out of the solid rock as in Fig. 9. The slopes of the hills are usually covered with timber; the limestone-covered uplands are mostly prairie. There are no large towns in the mountains. The Arbuckles include parts of Murray, Carter, Pontotoc and Johnston counties.



FIG. 9. ROCK CUT. THE RAILROAD  
BLASTED OUT OF THE ROCKS.

#### **Wichita Mountains.**

The Wichita Mountains in southwestern Oklahoma extend from Lawton to Granite, a distance of 60 miles.

The greater part of the Wichitas consists of scattered ranges, groups, and sharp, jagged peaks of granite and porphyry. The peaks are only the tops of buried moun-



tains projecting above a sea of plain. Mt. Scott, ten miles northwest of Lawton, is the highest peak. It is a round mountain of granite 1,200 feet above the level of the plain and 2,400 feet above sea level. Some other prominent peaks are Mount Sheridan, Mount Baker, Saddle Mountains (see Fig. 10), Tepee Mountain, Devil's Canyon Mountain and Headquarters Mountain. There is a little timber in the valleys and on some of the slopes in

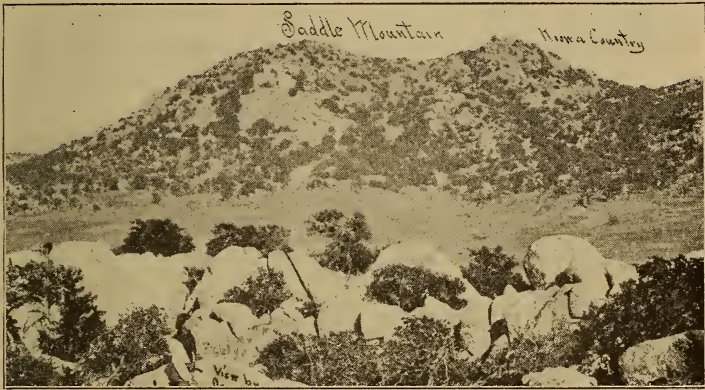


FIG. 10. SADDLE MOUNTAIN

Photograph by Dedrick, Taloga, Okla.

the eastern part of the range, but most of the granite peaks have no vegetation.

There are a number of strong springs among the mountains. Most of the larger creeks, such as Medicine Bluff, Rainy Mountain, Blue Beaver, Cache and others, head in mountain springs. The Wichitas are located in Comanche, Kiowa, Jackson and Greer counties. Lawton, Granite and Snyder are the largest towns near the mountains.

**Arkansas Valley Region** lies along the Arkansas and

Canadian rivers between the Ozark and Ouachita regions, extending southwest till it touches the eastern end of the Arbuckle uplift. The western limit where it merges with the Sandstone Hills region is poorly defined. The rocks consist of massive ledges of sandstone and shale, which have been thrown up by some internal force into immense folds, and afterward worn down by water, wind and frost, leaving a number of groups and ranges of high hills, some of which are more than 2,000 feet above sea level. The most prominent elevations, such as Cavinal, Sansbois, Sugar Loaf, Potato, Wild Horse, Rattlesnake, Kiowa and Beaver, are known locally as mountains. Between these various elevations are broad fertile valleys. The region is mostly timbered, although prairie land is found in the level country. This is the great coal country of Oklahoma. More than half the coal in the state lies in this region. For this reason it is destined to become one of the wealthiest parts of the state. All or part of Sequoyah, LeFlore, Haskell, Muskogee, Pittsburg, McIntosh, Latimer, Atoka and Coal counties are included in the Arkansas Valley region. A number of towns of considerable size are located in this region, the largest of which are McAlester, Coalgate, Lehigh, Wilburton, Poteau, Spiro, Sallisaw, Bokoshe, Stigler, Eufaula and Checotah.

**Red River Valley Region.** This region includes that portion of Oklahoma which lies north of Red River and south of the Ouachita and Arbuckle Mountains. It extends west to the Redbeds Plains south of the western end of the Arbuckles and grades into them. This is the lowest topographic region in Oklahoma, the average elevation above the sea being not more than 600 feet. A num-

ber of streams which rise in the mountains to the north and flow south across the region have carved out broad valleys. Little River, Kiamitia, Boggy, Blue and Washita rivers are the largest of these. The rocks are soft sandstone and shales, interstratified with two ledges of rather hard limestone, in which stream erosion has carved out low hills, and, in places, steep cliffs. The sandstone and shale exposures are usually wooded; the limestone areas are often prairie. Part or all of McCurtain, Choctaw, Bryan, Pushmataha, Atoka, Johnston, Marshall, Love and Carter counties lie in the Red River Valley region. The chief towns in the region are Ardmore, Marietta, Madill, Durant, Caddo and Hugo.

**Sandstone Hills Region.** The Sandstone Hills region includes that part of Oklahoma extending west from the Ozark Mountains and the Arkansas Valley region about as far as the main line of the Santa Fe Railroad, and from Kansas south to the Arbuckle Mountains. Throughout this region the rocks, which consist of alternating strata of soft shales and hard sandstones, either lie level or dip slightly to the west. The slope of the country is to the east. Erosion has worn away the soft shales and left the hard sandstone standing as prominent hills, which often form continuous ridges extending in a general north-east-southwest direction for many miles. In many cases, however, isolated buttes stand out on the level plain. The steep slope of all these hills is to the east, while the western slope is long and gentle. Some prominent ranges and peaks that have received distinctive names are Concharty Mountains, Council Hill, Bald Hills, Twin Knobs, Outlaw Mountain, Mount Inola, Catoosa Hills, Scaly Bark Mountain, Osage Knob, Chimney Hill, Shawnee Hills and

Claremore Knob. Flat prairie lands and wooded stream valleys occur between the hills. Many large rivers cross this region, including Arkansas, Verdigris, Grand, the three Canadians and Cimarron, with their numerous tributaries.

In the northern part of this region are the Flint Hills, which occupy western Osage and eastern Kay counties. The name comes from a number of ledges of flint which occur in heavy ledges of limestone. The flint is harder than the limestone and other rocks which form the hills. Where everything else has been worn away the flint remains, covering the ground. In Kansas the Flint Hills are higher and the flint more common than in Oklahoma.

The rougher parts of Sandstone Hills region, particularly the steep slopes, as well as the valleys, are forested; the intervening plains are grass-covered. This region includes all or part of the following counties: Craig, Nowata, Washington, Rogers, Mayes, Wagoner, Tulsa, Muskogee, Okmulgee, McIntosh, Pittsburg, Coal, Hughes, Pontotoc, Garvin, Seminole, Pottawatomie, McClain, Cleveland, Lincoln, Okfuskee, Creek, Payne, Logan, Noble, Osage and Kay.

This part of Oklahoma contains not only the greatest oil and gas fields in the State, but vast deposits of coal, clay and limestone. It is destined to become the great manufacturing region of Oklahoma. Many growing towns are located in this part of the State, the most important of which are Muskogee, Shawnee, Tulsa, Bartlesville, Vinita, Okmulgee, Holdenville, Pawhuska, Sapulpa, Wewoka, Okemah, Wagoner, Claremore, Pryor Creek, Ada, Chandler, Stillwater, Nowata and Pawnee. The soil is very fertile and a large variety of crops are raised.

**Redbeds Plains Region.** The Redbeds Plains extend west from the Sandstone Hills region and the Arbuckle Mountains to the Gypsum Hills, and from Kansas south to Red River. The southwestern part of the region entirely surrounds the Wichita Mountains. The rocks are known as Redbeds; they are largely soft clay shales, brick-red in color, with a few ledges of soft sandstone. The shales are so red that the water in the streams is colored blood-red. The surface is rolling. Steep bluffs are rare and high hills are unknown. Several rivers, Salt Fork, Cimarron, North Canadian, South Canadian, Washita and Red, flow across this region from northwest to southeast. These streams have carved broad and shallow valleys in the almost level plain. The south bluffs of these rivers for the greater part of their course in this region are cut up by small canyons and gulches, while the slope north of the rivers is unbroken and is often covered by sandhills. The high divides are remnants of the old plains surface, and their slopes to the east are so gentle as to be unnoticeable. One may often travel across the country for 20 miles along some lines without ascending or descending 20 feet from the general level.

The level plain is very fertile. There is very little waste land. It is the great wheat, alfalfa, cotton and corn country of Oklahoma. Except along the streams, where timber is sometimes found, this region is prairie. It includes all or part of the following counties: Kay, Grant, Alfalfa, Woods, Major, Garfield, Noble, Logan, Kingfisher, Blaine, Oklahoma, Canadian, Cleveland, McClain, Grady, Caddo, Garvin, Stevens, Jefferson, Comanche, Tillman, Kiowa, Greer and Jackson. Many of the largest towns in the State are in this region, including Oklahoma City, Guth-



rie, El Reno, Enid, Lawton, Chickasha, Norman, Kingfisher, Alva, Newkirk, Ponca and Blackwell.

**Gypsum Hills Region.** A great part of western Oklahoma is occupied by the Gypsum Hills region. The rocks here are red clay and shale as in the Redbeds Plains, but in this part of the State the red shales also contain hard members of gypsum and dolomite. These harder members weather out, forming high hills, cliffs



FIG. 11. GYPSUM HILLS, BLAINE COUNTY

and out lying buttes, so that the topography is more broken than in the Redbeds Plains.

There are three lines of Gypsum Hills in western Oklahoma. The first line, the so-called "Gyp Hills" of the cowboy, extends from Canadian County northwest to the Kansas line, crossing Blaine, Major, Woodward, Harper and Woods counties. These hills are 150 or 200 feet high, capped with two ledges of massive white gypsum 15 to 20 feet thick (shown in Fig. 11) and rise like a wall

above the Redbeds Plains to the east. Most of the gypsum plaster mills in Oklahoma are located along this line of hills. The second line of Gypsum Hills lies parallel to the line just described and is 40 to 50 miles further southwest. The highest hills are in Caddo, Washita, Custer, Dewey and Ellis counties. In this section of the State the hills are usually low white-topped, rounded gypsum knolls, which stand out on the plain or gentle slopes or along shallow streams. The third line of Gypsum Hills occurs in Jackson, Greer and Beckham counties. The ledges of gypsum are from 10 to 20 feet thick. Some of the hills consist of long, steep cliffs and some of rounded mounds. There are a number of hills in this region which are not formed by gypsum at all, but by hard ledges of dolomite or sandstone. For instance, the Red Hills between Geary and Watonga, and the Caddo County Buttes southwest of Bridgeport, are formed by a heavy ledge of dolomite. The hills in northern Beckham, eastern Roger Mills and western Washita, Custer and Dewey counties are formed by heavy ledges of sandstone. Several large streams, including Salt Fork, Cimarron, North Canadian, South Canadian, Washita and branches of Red River flow southeast across the Gypsum Hills. These streams have, in most places, cut deep, steep-sided valleys among the gypsum and sandstone ledges, and, in many places, have formed conspicuous cliffs and bluffs. This is a fertile region, as gypsum and dolomite are both good fertilizers. Corn is raised in all the counties; cotton in the southern part, and wheat in the northern section. The following counties are all or in part included in the Gypsum Hills region: Woods, Harper, Ellis, Woodward, Major, Blaine, Dewey, Canadian, Caddo, Custer, Roger Mills, Beckham,

Washita, Greer and Jackson. The chief towns are Woodward, Taloga, Cheyenne, Thomas, Watonga, Arapaho, Weatherford, Clinton, Elk City, Cordell, Sayre and Mangum.

**High Plains Region.** The High Plains includes the highest part of the State and lie west of the Gypsum Hills and at a higher level. This region is a part of that vast level tract lying east of the base of the Rocky Mountains and extending from Canada to Mexico. In Oklahoma this



FIG. 12. LAKE ON THE HIGH PLAINS

plain slopes from an altitude of 4,800 feet in western Cimarron County to a little more than 2,000 feet in Woodward and Ellis counties. In this plain Cimarron River and Beaver Creek have cut their broad, shallow valleys. A number of smaller creeks are at work dissecting the level uplands. Large areas remain, however, which appear to be as level as a floor and on which the only drainage is into broad, shallow depressions or lakes, sometimes called "buffalo wallows." One of these lakes is shown in Fig. 12. Until the last few years this has always been a cattle country. Recently the region has been settled



and crops, particularly kafir corn, milo maize, broom corn and sorghum, are raised. The soil is very fertile, but lack of rainfall sometimes prevents the crops from maturing. There is no timber except an occasional lone elm, cottonwood or willow along a stream. The whole country is covered with a soft carpet of buffalo grass. Cimarron, Texas, Beaver and parts of Harper, Ellis and Roger Mills counties are included in this region. The largest towns are Guymon and Beaver.

## QUESTIONS AND EXERCISES

1. Locate the Great Plains.
2. In what part of the Great Plains is Oklahoma located?
3. Where is the highest point in Oklahoma?
4. What is the average slope across the State?
5. What is the elevation of the lowest points in Oklahoma?
6. In what part of Oklahoma is the surface level?
7. Where are the mountains located?
8. Define Relief; Topographic Region.
9. Name and locate the different topographic regions in Oklahoma.
10. What is the character of the topography in the Ozark Mountains?
11. What kinds of rocks are found?
12. What is the average elevation?
13. What rivers flow near the mountains?
14. What creeks head in the mountains?
15. What is the character of the vegetation? Of the water?
16. Name the counties and cities in these mountains.
17. Apply questions 10 to 16 to the Ouachita, Arbuckle, and Wichita Mountains.
18. What is the character of the rocks in the Arkansas Valley Region?
19. Name the principal peaks.
20. What mineral is found in this region?

21. Name the counties and chief cities.
22. What streams cross the Red River Valley Region?
23. What is the character of the vegetation?
24. Name the counties and chief cities in the region.
25. Locate the Sandstone Hills Region.
26. What is the character of the rocks?
27. What streams cross the region?
28. Name the counties and chief cities.
29. Apply questions 25, 26, 27 and 28 to the Redbeds Plains Region, the Gypsum Hills Region, and the High Plains Region.
30. In what topographical region do you live?
31. What large streams, mountains, or hills are located near your home?

## CHAPTER III.

### GEOLOGY.

**Kinds of Rocks.** Oklahoma has a great many kinds of rocks and a great variety of soils. In some parts of the State there are mountains made up of solid granite; in other places the rocks are largely sandstone or limestone. In certain counties the only hard rock is white gypsum; in other localities there are no hard rocks of any kind exposed on the surface.



FIG. 13. FOSSIL CRINOID STEMS

**Fossils.** In some of the rocks of the State fossils may be found. Fossils are the remains of animals and plants which were alive when the rocks were laid down. Certain kinds of fossils are found in the rocks of certain ages. Geologists tell

the age of the rocks by the kind of fossils contained in them. Shells, something like our modern clams and oysters, trilobites which resemble the modern crayfish or crab, and various forms of corals and other sea animals, two of which are shown in Figs. 13 and 14, are found

preserved as fossils in the limestone rocks of many of the counties. In the coal regions there are remains of the leaves, stems and trunks of the plants which formed the coal. In southern Oklahoma immense coiled shells are found, something like our modern snail—many of which are three feet in diameter. On the High Plains in the western part of the State there are bones of the rhinoceros, tiger, camel and other large beasts which are not now found in North America. Bones of the mastodon, the extinct elephant, are found in many places.



FIG. 14. FOSSILS—CAMAROCRINUS

**Geologic Periods.** Geologists divide the history of the earth, since the time of the first fossils, into the following ten great divisions or periods. They are arranged in order of their age, the last named being the oldest.

Quaternary

Tertiary

Cretaceous

Jurassic

Triassic

Carboniferous

Devonian  
Silurian  
Ordovician  
Cambrian

**Sedimentary Rocks.** Rocks of these ages are sometimes called sedimentary rocks because they were laid down as sediments in former oceans, and sometimes strati-



FIG. 15. CONGLOMERATE ROCK

fied rocks because they are composed of strata or layers lying one above another. By far the greater part of the sedimentary rocks belong to one of three classes: sandstones, limestones or clays. Sandstones are composed of sand grains cemented together and are supposed to have been laid down along an old sea beach. Very coarse sandstone is called conglomerate, as shown in Fig. 15.

Limestones are made up largely of petrified shells and other fossils and were deposited either in the deep sea or in shallower water where conditions were favorable. Clay is hardened mud, and was formed in still bays and seas. If the clay is in thin layers it is called shale. Some form of stratified rock, either sandstone, limestone or clay, is found in most places on the surface of the earth.

**Igneous Rocks.** Below these sedimentary rocks lie igneous or fire-formed rocks. The most common forms are granite, porphyry, diorite, syenite and gabbro. Boulders of Oklahoma granite are shown in Fig. 16. Igneous rocks form the original crust of the earth and underlie everything else. If a person should drill anywhere on the surface of the earth, he would come to the granite or other igneous rocks, provided he went deep enough. In some places, usually in mountain ranges, these rocks are exposed on the surface, but in most regions they are covered with many thousands of feet of stratified rocks.

In order to understand the story written in the rocks of Oklahoma, it is necessary to study the formations exposed on the surface in all parts of the State. We must also go far back in the world's history, back to Cambrian times, to the times of the very first stratified rocks, the time of the first fossils.

**Oldest Rocks in Oklahoma.** The oldest stratified rocks exposed on the surface in Oklahoma are found in the Arbuckle and Wichita Mountains. These rocks were laid down many millions of years ago, just how long ago no one knows, when all this country was an open sea. In these regions there are a number of formations composed of limestone, sandstone and shale, lying one above the other. The very oldest stratified rock in the State is known as



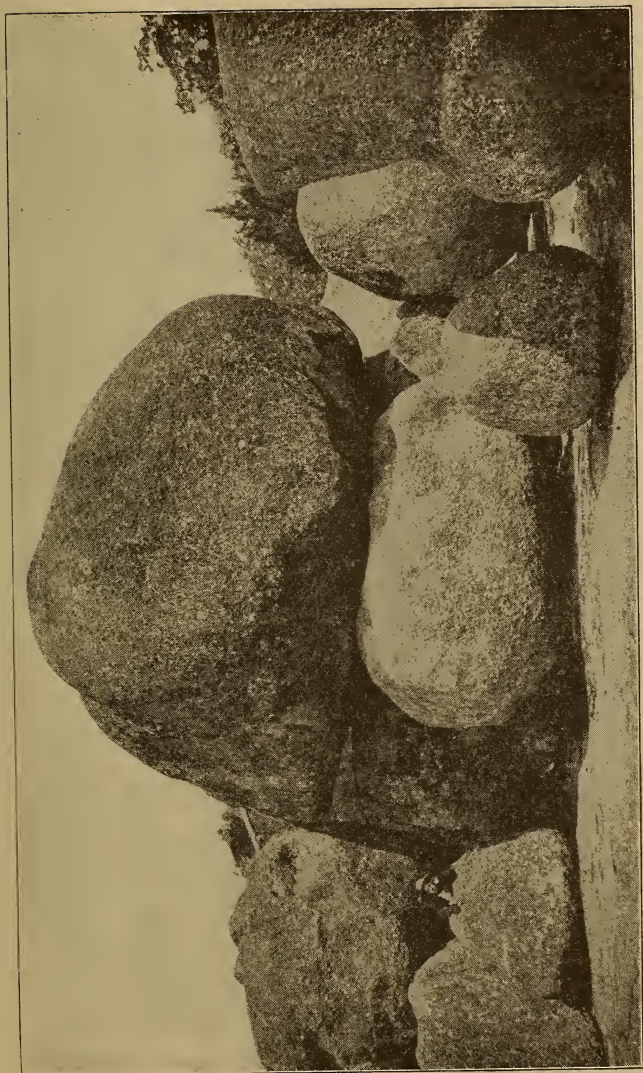


FIG. 16. BOULDERS OF OKLAHOMA GRANITE NEAR TISHOMINGO

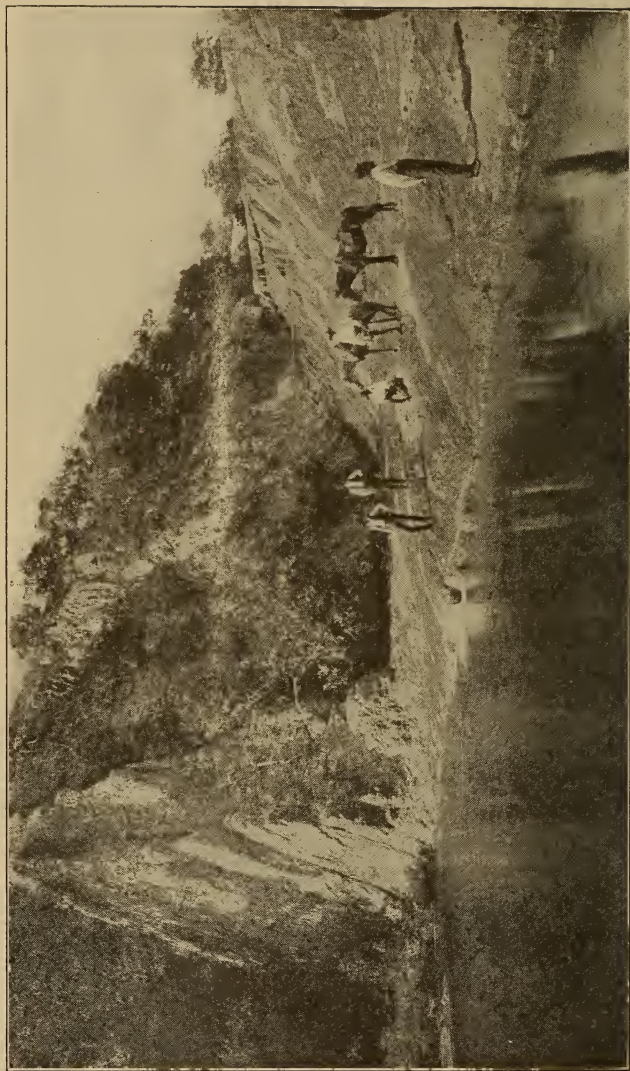


FIG. 17. LIMESTONE ON EDGE—OIL CREEK, OKLA.



the Reagan Sandstone. It lies directly on the granite, which is exposed as high peaks near the center of the mountain ranges. It is of Cambrian age. Above the Reagan is a very heavy ledge of limestone, the Arbuckle limestone, 6,000 to 8,000 feet thick, one of the heaviest ledges of limestone in the world. The upper part of the Arbuckle is Ordovician in age. Then comes the Simpson sandstone, 2,000 feet thick, and the Viola limestone, 800 feet thick, also of Ordovician age. Next is the Sylvan shale, then the Hunton limestone, which is of Silurian and Devonian age. A ledge of Hunton limestone standing on edge is shown in Fig. 17. Above the Hunton is the Woodford chert, probably of upper Devonian age. Figs. 5, 8, 9, 17, 18, 19, 20, 21, 33, 83 and 86 show the rocks of these various formations.

All these formations were laid down in regular succession in the long-gone prehistoric seas. Sometimes the country was raised—the land stood above water—and then it was eroded or worn away by the action of the elements. For the most part, however, the deposition of sediments was continuous, from the beginning of the Cambrian to the close of the Devonian age. During these times many animals lived, but they were all low forms of life. There were none of the higher forms, such as reptiles, birds or mammals, which were introduced at later geological periods. There were trilobites, corals, crinoids (Fig. 13), shells and bryozoa or sea-mosses in great numbers. Their skeletons have been preserved in the various formations as fossils. In the Hunton formation alone more than 200 different species have been found, the greater part of which are brachiopods, a kind of shell. There are many places in the Arbuckle Moun-



FIG. 18. THREE VIEWS OF WHITE MOUND NEAR DOUGHERTY, OKLA.

tains where the fossils are as thick on the ground as acorns under an oak tree. Fig. 18 shows three views of "White Mound," a fossil-bearing locality of the Hunton limestone. Fig. 19 shows a party of geology students from the University of Oklahoma, camped by the mountains, and Fig. 18 shows the same party collecting fossils at White Mound.

**Origin of the Arbuckle and Wichita Mountains.** During the next geological period, the Carboniferous, there



FIG. 19. CAMP OF GEOLOGY STUDENTS IN THE ARBUCKLE MOUNTAINS

was a series of great upheavals in many parts of North America. Large areas of land were raised above the ocean. The Appalachian Mountains in the eastern part of the continent and the Wichita and Arbuckle Mountains of Oklahoma were elevated at that time.

There are a great many places in Oklahoma where the rocks of these mountains may be studied, but one of the best localities, and the one most easily reached by many people in the State, is that part of the Arbuckle Moun-

tains along the Washita River between Davis and Ardmore. At this place one may find many fossils and see some very fine examples of folding and faulting, showing the effects of the terrific strains to which the rocks have been subjected. Fig. 20 shows rocks which have been folded, and Fig. 21 rock standing on edge. There are a number of waterfalls, the most noted of which are Turner's Falls (Figs. 6 and 7) and Price's Falls (Fig.



FIG. 20. FOLDED ROCKS

22), besides the Washita Gorge (Fig. 8), the "Burning Mountain" and other places of interest.

The geological structure of the mountains is shown in Figs. 23 and 24. Fig. 23 represents a section across the Arbuckle Mountains during Carboniferous times after the rocks had been deposited and the dome had been elevated above the ocean, but before it had been eroded. At that time the Arbuckle Mountains stood up as a great oval dome sixty miles long, twenty miles wide and two miles



high above the surrounding plains. As soon as it had been raised out of the water, the agents of erosion—rain, running water, wind, frost, etc.—began to cut away the rocks and to wash them down into the seas. The process continued for a long period of time. In fact, it is still in operation. The higher rocks which formed the top of the dome have all been worn away, exposing the rocks underneath, until at the present time nothing remains



FIG. 21. ROCKS ON EDGE

but the eroded stump of the old mountain, as shown in Fig. 24. In passing from the Washita River to the granite peak 700 feet high known as the East Timbered Hills, which forms the core of the mountains, one walks over the upturned edges of more than two miles of stratified rocks, including limestones, shales and sandstones. In ascending 700 feet in altitude one descends more than 10,000 feet geologically.

**Carboniferous Rocks.** During Carboniferous times

much of Oklahoma was under water and vast deposits of sedimentary rocks were laid down. The rocks of the Carboniferous period are divided into the following series, the oldest being last named:

Permian

Pennsylvanian

Mississippian

**The Mississippian.** Rocks belonging to all of the three



FIG. 22. PRICE'S FALLS, ARBUCKLE MOUNTAINS

divisions of the Carboniferous are well exposed in Oklahoma. In the Ozark Mountains there is a formation 300 feet thick, composed largely of limestone, known as the Boone Chert, which is of Mississippian age. This is the rock which contains the lead and zinc. On passing west these Mississippian rocks pass beneath the surface and are covered by rocks of the next younger age, the Pennsylvanian.

**The Pennsylvanian.** With the exception of the forma-

tions exposed in the Ozark Mountain practically all the rocks in eastern Oklahoma are of Pennsylvanian age. They are the Coal Measures. At the time when these rocks were deposited there were vast areas of swamps and marshy lowlands in this region in which grew great number of ferns and trees, forming dense and heavy

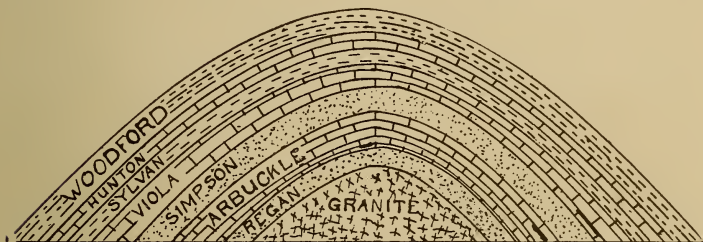


FIG. 23. CROSS-SECTIONS OF THE ARBUCKLE MOUNTAINS BEFORE EROSION

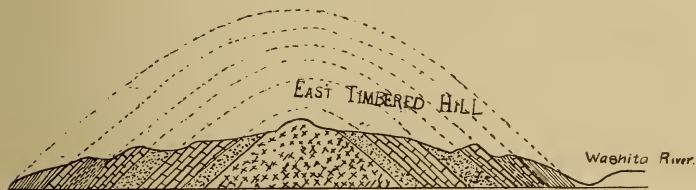


FIG. 24. CROSS-SECTIONS OF THE ARBUCKLE MOUNTAINS AT THE PRESENT TIME

vegetation. This vegetation accumulated through the long years so that it finally formed thick deposits, which gradually changed into beds of coal. Many of the leaves, stems and trunks of these coal plants are now preserved in the rocks. If you examine a piece of coal you will probably find in it traces of leaves and stems of the coal plants.

After a long period of accumulation the surface was submerged below the ocean and deposits of sand and



mud were laid down, which, on hardening, formed sandstone and shale. After a time the region was again elevated, other swamps and marshes were formed, vegetation grew once more and formed other accumulations which were changed into coal. This elevation and subsidence continued for a long time. Strata more than 15,000 feet thick were laid down in eastern Oklahoma. More than 20 veins of coal were formed, about 10 of which are thick enough to be worked. One of these veins extends from near Fort Smith, Arkansas, to Lehigh, Oklahoma, a distance of 150 miles. Another one comes to the surface along a line running from Pittsburg, Kansas, into Oklahoma and south past Chelsea, Claremore, Catoosa, Broken Arrow and Henryetta to the Canadian River. The Pennsylvanian rocks dip west and pass beneath the next younger rocks, the Permian Redbeds.

**The Permian.** During Permian times, after the coal beds had been laid down, the character of the deposits in Oklahoma changed. The Redbeds which occupy so much of western Oklahoma were probably deposited in shallow seas or in salt lakes something like the Red and Caspian seas today. The Redbeds consist of a great mass of red clay shales, of unknown thickness, which covers an area extending from Kansas across western Oklahoma and northwest Texas to New Mexico. Besides the red shales there are a few ledges of white gypsum, red sandstone and gray dolomite, which is a kind of limestone. It is the unequal weathering of the ledges of hard gypsums, sandstones and dolomites that makes up the Gypsum Hills, the Red Hills and other hills of western Oklahoma. Among the Redbeds there are beds of salty shale, and the water which runs across these salty beds issues as salt

springs. There are very few fossils of any kind in the Redbeds and little indication of coal, oil or gas.

**Triassic and Jurassic Times.** At the close of the Permian times practically all of what is now Oklahoma was elevated above the ocean, and the greater part of it has never again been submerged. During Triassic and Jurassic times all the country except possibly a part of western Cimarron County stood out of the water. There are some deposits along the bluffs of Cimarron River near Kenton, in the extreme western part of the State, which may be of Triassic and Jurassic age.

**Cretaceous Rocks.** During Cretaceous times parts of southern and western Oklahoma were again submerged beneath the ocean and deposits of shale, sandstone and limestone were laid down. Almost all the rocks in that part of the State which lies south of the Ouachita and Arbuckle mountains, extending along Red River from the Arkansas line west to Ardmore, are of Cretaceous age. These rocks contain petrified oyster shells, large coiled shells called ammonites, sharks' teeth and bones of reptiles and other animals which lived during Cretaceous times. All the fossils found in these rocks are very different from those in the Arbuckle Mountains or among the coal beds. They represent higher forms of life and show a great advance over the earlier forms. In several of the counties in western Oklahoma shell rock of Cretaceous age occurs on the hills, indicating that the Cretaceous seas extended over that country also.

**Tertiary Rocks.** During Tertiary times Oklahoma stood out of the water and the surface was worn down about to its present level. It was at this time that the Rocky

Mountains were being eroded very rapidly and the material washed from the mountains—sand, pebbles, clay, silt and mud—was carried eastward by streams and spread out on the plains. This process continued for a long time until deposits several hundred feet thick were accumulated. This Tertiary deposit now makes up nearly all the surface rocks on the High Plains in western Texas, Oklahoma, Kansas, Nebraska and the Dakotas, as well as in eastern New Mexico, Colorado, Wyoming and Montana. The greater part of the rocks exposed on the surface in Cimarron, Texas, Beaver, Harper and Ellis counties are of Tertiary age. It is believed that the sand in the sandhills along the north side of so many of the streams in central and western Oklahoma is derived from the same source. It must be remembered that the Tertiary is only a superficial blanket spread out over the rocks beneath, so that if a person will dig deep enough anywhere on the High Plains he will come to the underlying rocks, either Redbeds or Cretaceous rocks. These Tertiary rocks carry the good water found in wells and springs in western Oklahoma.

The Tertiary is sometimes called the age of mammals. A great many large and strange beasts lived at this time, some of which have become extinct, while others have disappeared from North America and are now found only in Asia and Africa. In the rocks of the High Plains have been found bones of the three-toed horse, rhinoceros, primitive buffalo, pig, camel, hyena, saber-toothed tiger, armadillo, llama, tapir and mastodon, none of which are now native to this country.

During Tertiary times there were a number of volcanoes in what is now northeastern New Mexico and

southeastern Colorado. One of these volcanoes was only a few miles from the northwest corner of Cimarron County and the lava flowed east and now forms the cap of Black Mesa, which extends for four miles into Oklahoma. Ashes and dust from these volcanoes, carried by western winds, drifted east and settled to the surface. Beds of "volcanic ash" are found among the Tertiary deposits in the western counties.

**Quaternary Rocks.** Rocks of Quaternary age are represented in Oklahoma by surface deposits, such as the alluvial bottom lands along the streams and the black soil on the high divides. There is no evidence of glacial deposits in the State. The nearest point reached by the ice sheet during the Quaternary times was in the vicinity of Topeka and Manhattan, Kansas. The most common fossils in Quaternary rocks are skeletons of the mammoth and mastodon. Mastodon bones have been reported from nearly every county in the State.

#### QUESTIONS AND EXERCISES

1. Name some kinds of rock found in Oklahoma.
2. Define a fossil. How were fossils formed?
3. What kinds of fossils are found in Oklahoma?
4. Name ten geological periods.
5. Define sedimentary rock. Stratified rock.
6. Name the three chief kinds of sedimentary rock.
7. How was each kind formed?
8. Name the chief igneous rock.
9. What and where is the oldest stratified rock in Oklahoma?
10. Name the Arbuckle Mountain series.
11. What fossils are found in these rocks?
12. Describe the history of these mountains.
13. Why are they not as high as they once were?
14. What are the divisions of the Carboniferous period?

15. Where in Oklahoma are rocks of each division exposed?
16. How was coal formed?
17. What is the character of the Pennsylvanian rocks in Oklahoma?
18. What is the character of the Permian rocks in the State?
19. What minerals are found in the Permian rocks?
20. What was the condition of Oklahoma during Triassic and Jurassic times?
21. Where in the State are Cretaceous rocks found?
22. What fossils are found in the Cretaceous rocks?
23. Describe the Tertiary rocks.
24. From what were they derived?
25. What fossils are found in them?
26. Where are the Quaternary rocks?



## CHAPTER IV.

### UNDERGROUND WATER.

**Disposal of Rainfall.** Water which falls upon the surface of the earth in the form of rain, snow or hail is disposed of largely in one of three ways. Part of it evaporates, part soaks into the ground, and part runs off, forming streams. The evaporated water passes into the air in the form of vapor and may again become rainfall. The water which passes into the streams is soon carried away. The amount of water which soaks into the ground varies from place to place with the character of the soil, the slope of the surface and the dryness of the climate. In a loose, sandy soil, or a level country, a large amount of water will soak in. If the country is hilly or the surface material compact, a much smaller quantity will be absorbed.

**Underground Water.** Part of the water that enters the soil is caught up by the roots of plants and some comes to the surface again and is evaporated into the air. The greater part of it, however, sinks to lower levels in the ground. At some distance below the surface all the pores or open spaces in the rock and soil are completely filled with water. That is to say, the ground, deep down, is saturated with water, forming the **zone of saturation**. The top of this zone of saturation is known as the **water table**. In some places, as in a swamp or marsh, the water table is at the surface; in other places it may be hundreds of

feet deep. It rises nearer the surface during rainy seasons and sinks during dry times.

**Movement of Underground Water.** Underground water is everywhere slowly moving. From the uplands it moves to the valleys and in the valleys it moves downstream. In coarse sand and gravel, where the pores are large, the water moves faster than through clays or other fine-grained rocks. The rate of motion is never rapid, however. Experiments conducted by the United States Geological Survey along the valley of the Arkansas River show that the average rate of flow of underground water in the valley does not average more than 12 to 20 feet a day, or about a mile a year.

**Springs.** Springs have their source in the underground water. They usually issue at the point where a porous bed comes to the surface. Most springs occur at the bottom of a ledge of sandstone, gravel or porous limestone and above a bed of fine-grained clay or shale.

Springs are found in all parts of Oklahoma. In some of them the water is fresh and pure; in others it contains gypsum or salt. In several parts of the State there are strong springs of sulphur water.

Some of the finest springs in Oklahoma are in the Ozark Mountains, in the northeastern part of the State. In this region the water issues from below a ledge of limestone and just above a heavy, fine-grained shale. There are thousands of these springs along the creeks and on the mountain sides. Some of the most famous are at Tahlequah, Salem Springs, Wauhillau, Spavinaw, Bunch and Stilwell.

In the Arbuckle Mountains there are a great many strong springs. The water comes usually from crevices in the limestone and coarse sandstone. The spring at old

Fort Arbuckle is shown in Fig. 25. Such streams as Sulphur Creek, Honey Creek, Falls Creek, Pennington Creek, Oil Creek, Mill Creek and Blue River, which flow all year, are fed by Arbuckle Mountain springs. In the Wichita Mountains there are a number of springs, some of which issue from crevices in granite rocks; others come from the limestone.

In the sandstone country of eastern Oklahoma there

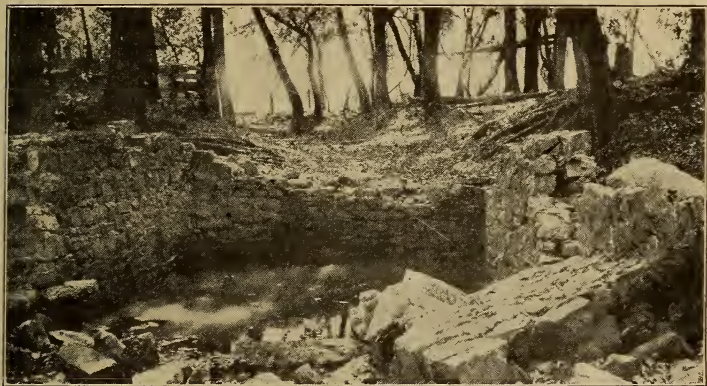


FIG. 25. SPRING AT OLD FORT ARBUCKLE—WALL BUILT IN 1852

are occasional springs which issue from under sandstone ledges. There are many springs in the limestone country of the Flint Hills in the northern part of the State. One of the most noted is Big Spring, on Little Beaver Creek, near Hardy.

There are not many springs in the fine-grained shales of the Redbeds in the central counties. Among the Gypsum Hills springs are very common, many of them being very strong. The water in this region usually contains gyp-

sum and other mineral salts in such quantities that it is often unpleasant to drink. The purest spring water in western Oklahoma comes from springs in the sandhills and the high upland. These are usually called Tertiary springs because they come from a geological formation known as the Tertiary. Examples of Tertiary springs are the Cleo Springs, Elm Springs at Alva, Caddo Springs north of El Reno and several large springs near Moscow, Aline, Grand and Woodward.



FIG. 26. MINERAL SPRINGS AT BROMIDE

**Mineral Springs.** Mineral springs are found in many parts of the State. The most famous are at Sulphur and Bromide (Fig. 26) in the Arbuckle Mountains. There are several sulphur springs in the Wichita Mountains, particularly those near Granite and Rainy Mountain. Others occur in the Ouachita and Ozark mountains. Several health resorts are located near these springs. Platt National Park is a government reservation which includes the mineral springs at Sulphur.

**Wells.** A well is an excavation extending from the surface down to the zone of saturation. Well water is ground

water obtained through an artificial opening in the ground. It flows out of the sand or gravel in which the well usually ends and fills the well to the level of the water table—in other words, as high as the top of the zone of saturation.

During wet weather the water table is raised and the water stands higher in the well. During times of drought the water table is lowered and the water in the well becomes low, or it may disappear entirely. Wells in the valley are usually shallow, because the water table is near the surface. Upland wells are often deep because the water table is deep. An ordinary well-drilling machine is shown in Fig. 27.

There is no part of Oklahoma in which water is not obtained in wells. In the four mountain regions, however, but few wells have been sunk. There are two reasons for this. First, there are few people living among the mountains; and, second, there are plenty of springs to supply water for domestic use. In the Sandstone Hills region of eastern Oklahoma wells are common, and they usually find an abundant supply of pure water at less than 50 feet. In the Redbeds and

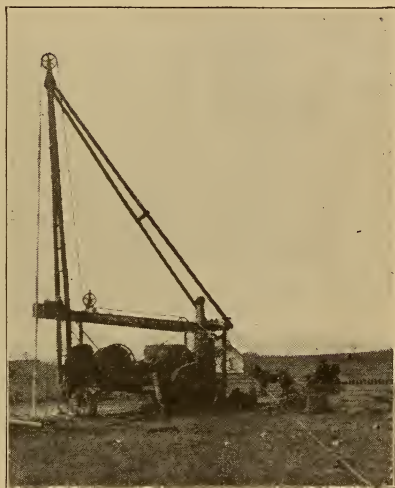


FIG. 27. WELL DRILLING MACHINE



Gypsum Hills regions water is usually deeper, varying from 50 to 100 feet. The water often contains gypsum or salt. The best well water in Oklahoma is found among the sandhills and on the High Plains in the western part of the State. The wells are sometimes as much as 300 feet deep. The water is abundant, cool and pure. Windmills are used to bring the water to the surface.

**Artesian Wells.** There are three regions in Oklahoma



FIG. 28. AN ARTESIAN WELL AT LEHIGH

in which artesian wells are found. An artesian well is one in which the water rises in the well, usually coming to the surface. Wells of this kind are found only where the rock strata lie in a peculiar manner. The water enters the ground at a level higher than the mouth of the well and usually passes underground for some distance.

There is an area occupying several counties in northeastern Oklahoma in which artesian wells are found which produce strong mineral water. Wells have been

put down at Miami, Afton, Welch, Bluejacket, Vinita, Pryor Creek, Wagoner, Chelsea, Claremore and Nowata. The water is used for medicinal purposes. At Claremore the water is very strong in mineral salts and is called Radium water. At Wagoner it is called Germicide. The source of supply of all this mineral water is in the Ozark Mountains to the east. Another artesian well region is at Sulphur in Murray County. The water is strong with sulphur gases, being very similar in taste to the water in the springs near by. The water enters the ground in the Arbuckle Mountains to the south. A third region is near Lehigh, Coal County. A well is shown in Fig. 28.

#### QUESTIONS AND EXERCISES

1. How is rain water disposed of?
2. What becomes of the water that soaks into the ground?
3. Define Zone of Saturation. Water Table.
4. What is the average rate of flow of underground water?
5. Define spring.
6. When does a spring usually issue?
7. Where in Oklahoma are springs found?
8. Discuss the springs of the Ozark Mountains; the Arbuckle Mountains; the Sandstone Country; the Gypsum Hills; the Tertiary Springs.
9. Locate the salt springs of Oklahoma.
10. Locate the mineral springs of Oklahoma.
11. Define a well.
12. Discuss wells in various parts of Oklahoma.
13. Where are the artesian well regions in the State?

## CHAPTER V.

### DRAINAGE.

**Origin of Streams.** Streams are fed partly by the rain water which runs off the surface and partly by water from springs. If the rainfall is slow and gentle and the soil is level and sandy, the greater part of the water will soak into the ground. This descends to the zone of saturation and finally issues in the form of springs. On the other hand, if the rainfall is violent and the surface rocky and steep, most of the water will run off and find its way into small streams. A number of small streams unite to form a creek, and a number of creeks form a river. Streams fed largely by springs usually flow all year, but those supplied by rainfall only carry no water in dry times. After very heavy rains streams become large and often overflow their banks.

**Chief Streams of Oklahoma.** All the drainage of Oklahoma is into the Mississippi River. The two largest rivers in the State, the Arkansas and the Red, are tributaries of that river. All other large streams in Oklahoma are tributaries of either the Red or the Arkansas. The general course of the streams is southeast, following the slope of the Great Plains. The Arkansas River and its tributaries drain the **northern** part of the State, about two-thirds in all. Red River, which forms the southern boundary, receives the drainage of the **southern** third of the State.

None of the large rivers of Oklahoma rises in the State.

The Arkansas and its largest tributary, the South Canadian, rise among the snow-covered granite peaks of the Rocky Mountains. All the other streams rise in surrounding states.

**Character of Oklahoma Streams.** Generally the streams in western Oklahoma are very different in appearance from those in the eastern counties. The western streams flow in broad, sand-choked channels with low sand banks. They are supplied largely from run-off after heavy rains. Often for months at a time there will be little water in the channel. The river may be dry from bank to bank, when suddenly, without warning, a wall of foaming water several feet high, carrying all sorts of debris, will rush downstream at great speed, filling the channel bank-full. For several days the water will be high, then it will gradually recede and the channel will be dry again.

In eastern Oklahoma, on the other hand, the streams have deep channels, containing very little sand, with muddy or rocky banks. These streams are spring-fed and usually contain water all the year. During the dry season the water is low, but after heavy rains the channel is bank-full.

**Drainage Basins.** The area drained by a river or a river system is known as its basin. There is a great difference in the shape of the drainage basins of eastern and western Oklahoma. Those in the western part of the State are long, narrow and ribbon-like in outline, while those farther east are oval in outline. This condition is shown on the drainage map, Fig. 29.

**Arkansas River.** The Arkansas River, the largest stream in Oklahoma, flows for 200 miles across the north-east corner of the State. This river rises in the Rocky

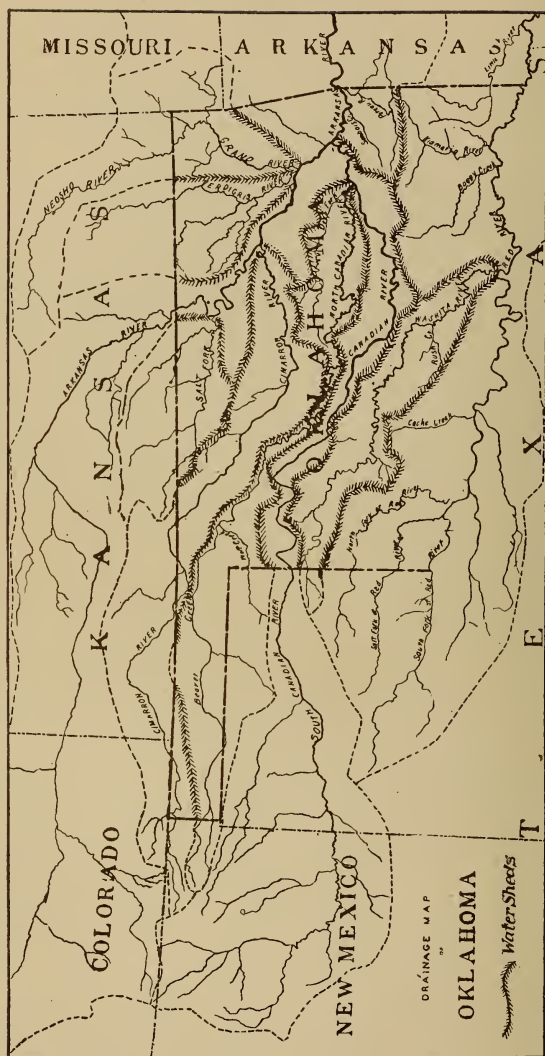


FIG. 29. MAP SHOWING THE DRAINAGE BASINS OF OKLAHOMA



Mountains and flows in a broad, shallow channel south-east across the plains of Colorado and Kansas. Near Arkansas City, Kansas, a few miles north of the Oklahoma line, it strikes the Flint Hills, and from this point to Tulsa, near the southeast corner of Osage County, it flows in a crooked channel among the limestone hills. Fig. 30 shows the Arkansas in eastern Kay County. The distance is about 90 miles direct, but as traversed by the river is nearly twice as great. From Tulsa to Fort Smith, Ark.,



FIG. 30. VALLEY OF THE ARKANSAS RIVER IN KAY COUNTY

where the river flows from the State, the Arkansas flows in a broad, fertile valley often bounded by sandstone hills.

The bed of the Arkansas is filled with sand. In Colorado and western Kansas much of the water is taken out for irrigation, so that in northern Oklahoma there is often little water in the channel. The many tributaries in the State furnish water to keep the river flowing all the year. From the point near Muskogee, where the Verdigris and Grand rivers empty, the Arkansas is navigable for small boats part of the year.

The chief streams which enter the Arkansas from the north are the Grand and Verdigris. The principal southern tributaries are the Poteau, Canadian, Cimarron and Salt Fork. Other smaller tributaries of the Arkansas are Lees, Sallisaw, Vian, Illinois and Beaver creeks, which enter from the north, and Sansbois, Polecat, Blackbear and Redrock creeks, from the south.

**Grand River.** This stream, the largest northern tributary of the Arkansas, is formed by two streams, Neosho and Spring rivers, which unite in the northern part of the State. The Neosho River drains southeastern Kansas and Spring River drains southwestern Missouri. Grand River flows through a fertile valley along the western edge of the Ozark Mountains and enters the Arkansas at Fort Gibson. It is a clear, swift stream flowing over a rocky or pebbly bed. It carries a large amount of water and is one of the finest rivers in the State. Spavinaw, Saline, Pryor and Big Cabin creeks are the largest tributaries.

**Verdigris River.** Verdigris River rises in east-central Kansas and flows south. It crosses Nowata, Rogers and Wagoner counties before entering the Arkansas near the mouth of the Grand. The river flows through a broad valley, much of which is swamp land, in a crooked channel with steep mud banks. The chief tributaries are Caney, Bird, Dog and Big creeks.

**Poteau River.** The Poteau is the only large stream in Oklahoma that flows north. It takes its rise among the high sandstone hills of the Ouachita Mountains in southwestern Arkansas, flows northwest and enters Oklahoma in southeastern Le Flore County. The river follows a tortuous course, flowing back and forth among the sand-

stone bluffs, and empties into the Arkansas River at Fort Smith. The channel is deep, with steep rock and mud banks; the valley is sometimes broad and sometimes narrow. Several veins of coal cross the valley and the region is destined to become, in time, a wealthy manufacturing section. Brazil Creek and Black Fork are the chief tributaries.

**South Canadian River.** The South Canadian, the largest tributary of the Arkansas, rises in New Mexico. It crosses the Panhandle of Texas before entering Oklahoma, and then flows for 350 miles and joins the Arkansas 40 miles above Fort Smith. In the western part of the State the river swings back and forth in a series of ox-bow bends and flows in a canyon-like valley about 200 feet deep. In Dewey and Custer counties it flows among the Gypsum Hills. The drainage basin in Oklahoma is narrow, not averaging more than 20 miles wide, while in places it is less than 10 miles. The channel is sand-choked and averages half a mile in width, the banks being low and sandy. The channel is constantly shifting, and bends and cut-offs are common. It is the most uncertain and treacherous of all Oklahoma streams. Sudden and rapid rises are common. Fig. 31 shows a team crossing the South Canadian in high water. The largest tributary is the North Canadian, which in turn receives Deep Fork. The river has few large tributaries in Oklahoma, the largest being Gaines Creek, Little River and Deer Creek.

**North Canadian River.** The North Canadian is formed by Wolf Creek and Beaver Creek, which unite at Fort Supply, in Woodward County. Wolf Creek rises in the northern part of the Panhandle of Texas and flows northeast. Beaver Creek rises among the volcanic peaks in north-

eastern New Mexico. It flows east across Cimarron, Texas, Beaver and Harper counties before joining Wolf Creek. Its chief tributaries are Coldwater, Palo Duro, Clear and Kiowa creeks. The North Canadian flows parallel to the South Canadian across Oklahoma. The width of the drainage basin does not exceed 20 miles and in several places the distance from the bed of the North Canadian across the divide north of the stream to the water of the Cimarron is not more than a mile. Its bed averages 200



FIG. 31. A TEAM CROSSING THE CANADIAN RIVER IN FLOOD

feet higher than the valley of the Cimarron. There is a saying in western Oklahoma, "the North Canadian flows on a ridge." In its upper course the bed of the stream is filled with sand and the banks are low, but from Oklahoma City eastward the amount of sand decreases and the banks are steep and muddy. The water is purer than that of most streams in the State, partly because it is fed largely by springs from the sandhills, and partly because no salt springs drain into this stream. North Canadian has few tributaries. Deep Fork is the largest. Others of some importance are Wewoka, Persimmon and Indian

creeks. Deep Fork rises in Oklahoma County and flows east across Lincoln, Creek and Okmulgee counties. It is a narrow stream flowing in a crooked channel. The bottom lands along this stream are subject to frequent overflow.

**Cimarron River.** The Cimarron rises among the volcanic peaks of northern New Mexico and flows east, crossing parts of Oklahoma, Colorado and Kansas before finally entering Oklahoma at the Salt Plain on the Woods-Harper county line. For 60 miles or more it flows in a broad canyon among the Gypsum Hills, then passes out onto the Redbeds Plains and flows east and enters the Arkansas River at the southeastern corner of Pawnee County. The Cimarron drainage basin is broader and more regular in outline than that of any other stream in western Oklahoma, averaging more than 40 miles wide. The bed is broad and sandy, with low sand banks, as shown in Fig. 32. The flow of water is intermittent, and the stream is subject to sudden and rapid rises, rendering it often unsafe to ford. Below the Salt Plains the water contains a large amount of salt, rendering it unfit to use. The chief tributaries are Buffalo, Eaglechief, Salt, Turkey, Kingfisher, Cottonwood, Skeleton and Stillwater creeks.

**Salt Fork River.** The Salt Fork of the Arkansas, another typical stream of the plains, rises in southern Kansas and flows east across Woods, Alfalfa, Grant and Kay counties, a distance of 115 miles, before entering the Arkansas. The banks are low and sandy and the channel is filled with sand. The stream carries pure water as far as the Salt Plains in Alfalfa County, but below that point the water is salty. The valley of the stream is very fer-



tile. The principal streams which empty into Salt Fork are Medicine, Mule, Sand, Chikaskia, Deer, Cottonwood and Bois d'Arc creeks.

**Washita River.** The Washita is the only stream in western Oklahoma which has steep mud banks and little sand in its channel. This is accounted for by the fact that the Washita flows across the Redbeds for almost its entire course. Rising in the Panhandle of Texas, it flows



FIG. 32. CIMARRON RIVER, SHOWING THE LOW, SANDY BANKS.

east into Oklahoma and across Roger Mills, Custer, Washita, Caddo, Grady, Garvin, Murray, Carter, Johnson and between Marshall and Bryan counties before emptying into Red River. In the western part of the State the river cuts its way through the Gypsum Hills. Then it flows out on the Redbeds Plains as far as the Arbuckle Mountains. It crosses these mountains in a deep gorge which it has cut through limestone rocks. (Fig. 33.) South of the Arbuckles it crosses the Cretaceous forma-

tions. The valley of the Washita is one of the most fertile parts of Oklahoma. Its chief tributaries are Quartermaster, Cavalry, Rainy Mountain, Cobb, Sugar, Little Washita, Rush, Wild Horse, Caddo, Mill and Pennington creeks.

**Red River.** Red River forms the southern boundary of Oklahoma. This river resembles the Cimarron and South Canadian in having a broad and sandy channel and an intermittent flow. The name of the river is derived from



FIG. 33. LIMESTONE IN THE WASHITA GORGE

the color of the water, and the red color comes from the Redbeds across which the river flows. The river rises on the High Plains, or Llano Estacado, of northern Texas. In its upper course it flows for nearly 100 miles in Palo Duro Canyon, which is in places 1,000 feet deep—the deepest gash cut by stream erosion anywhere on the Plains.

Red River has a number of tributaries in southern Oklahoma. The Washita has already been described. Little River (Fig. 34) and Kiamitia (Fig. 33) drain the Ouachita Mountains. Boggy Creek drains the southern part of the Sandstone Hills region and the country between the

Ouachitas and the Arbuckles. Blue River drains the eastern part of the Arbuckles. Mud and Beaver creeks drain the southern part of the Redbeds Plains, which lies between the Arbuckles and the Wichitas. Cache Creek drains the eastern part of the Wichitas and the surrounding plain. North Fork of Red River rises in the Panhandle of Texas and flows southeast. Its chief tributaries are Elm Fork, Elk and Otter creeks. Salt Fork empties into South Fork. North, South, Salt and Elm Forks



FIG. 34. VIEW ON LITTLE RIVER, EASTERN OKLAHOMA

of Red River are typical streams of the Plains, with broad, sandy channels and low banks. The other streams named have steep mud or rock banks and carry little sand.

**Lakes.** Oklahoma has no large lakes. Lakes are characteristic of an ill-drained country, and Oklahoma is everywhere well-drained. Along the larger streams, such as Arkansas, Red and Canadian rivers, there are a few long and narrow lakes that have been formed by cut-off bends. On the High Plains there are numerous broad, shallow basins which are sometimes filled with water, but these are seldom more than 100 yards in diameter. Arti-



FIG. 35. FERRY BOAT ON KIAMITIA RIVER



FIG. 36. AN ARTIFICIAL LAKE NEAR NEWKIRK

ficial reservoirs; sometimes known as "tanks" are common in grazing regions. Fig. 36 shows an artificial lake near Newkirk.

### QUESTIONS AND EXERCISES

1. How are streams fed?
2. Into what stream does all the drainage of Oklahoma finally flow?
3. Name the two largest rivers in the State.
4. Where do the large rivers of Oklahoma rise?
5. What difference is there between the streams in eastern and western Oklahoma?
6. Study the drainage map. Notice the source and direction of the various rivers.
7. Trace the divide between the Arkansas and Red River.
8. Compare the shape of the drainage basin of North Canadian and Grand River.
9. Describe the Arkansas River, noting source, direction of flow, chief tributaries, counties crossed or bordered, and chief cities.
10. Describe likewise the Grand; Verdigris; Poteau; South Canadian; North Canadian; Cimarron; Salt Fork.
11. Describe Red River; Washita.
12. Why has Oklahoma no large lakes?



## CHAPTER VI.

### WEATHER AND CLIMATE.

Weather refers to the condition of the air in regard to rain, clouds, wind and heat. Climate is the sum total of the weather for a long period of time. The weather often changes suddenly, but climate changes so slowly that we can rarely observe any variation in it.

**Weather.** The chief factors which go to make up the weather in any particular region are temperature, winds, humidity, sunshine and cloudiness and precipitation. If we know these we can determine what the weather will most likely be. These terms will now be explained.

**Temperature.** Temperature is the amount of heat that any region receives, and is a very important thing to consider, for upon it depends largely the kind of animal and plant life in any place. Weather may be hot, cool or cold. The average temperature for a day or year is called the **mean** temperature. The difference between the highest, or maximum, and lowest, or minimum, is called the **range** of temperature.

**Air.** Air is a mixture of several gases. The most important are nitrogen, oxygen, carbon dioxide and water vapor. The great body of air which surrounds the earth is called the atmosphere. Like other substances, air has weight. At the surface of the ocean, where the pressure is greatest, 13 1-3 cubic feet of air weigh a pound and the weight of the air on every square inch of surface is

about 15 pounds. As we ascend from sea level the density of the air constantly decreases and thus the air becomes lighter. When air is heated it rises. Other air rushes in to supply its place, forming winds. You have noticed that when a strawstack or brush pile was burned on a still day the heated air ascended, carrying with it a column of smoke. If you will walk around the fire you will find that the air is moving inward toward it from all directions. The ascending column of air and the currents flowing into it from all directions is a good illustration of what is happening at the point of low pressure in one of the great cyclonic storms which pass over Oklahoma.

**Wind.** Wind, then, is air moving along the surface of the earth, and it is caused by the unequal heating of the air in different places. The rate at which the air moves varies greatly. A gentle breeze which hardly moves the leaves moves about two miles an hour. A prairie wind may move 15 to 20 miles an hour, and a destructive storm as much as 80 or 100 miles an hour.

**Humidity.** By the term humidity we mean the amount of water vapor in the air. If the air contains little moisture the humidity is low. If much moisture is present the humidity is high. When air contains as much water vapor as it will hold it is said to be saturated. The warmer the air the more water vapor it will hold. If saturated air is cooled, the water vapor is condensed in small drops, forming clouds, fog or dew. Clouds form a curtain in the sky and prevent the direct rays of the sun from reaching the earth. In some countries clouds are almost always present, but in Oklahoma about 250 days in the year are

clear. There are more clear days in the western part of the State than in the eastern.

**Precipitation.** The term precipitation is used to include all the moisture that falls on the surface of the earth. In one climate by far the greater part of the precipitation is in the form of rain; in another it may be snow. In Oklahoma the greater part is in the form of rain. During the summer months hail sometimes falls. In the winter the drops of water are often frozen as they pass through the air and form sleet. When the moisture in the air is condensed at a temperature below freezing point frost or snow results. The greatest amount of rain in any one month falls in May.

**Weather Bureau.** One of the departments of the United States Government is the Weather Bureau. Under the direction of this bureau stations have been established at every large city and at many other places for the purpose of observing and recording weather conditions. At these various stations observations are made twice a day—at eight o'clock, morning and evening, Washington time. The observer notes the direction of the wind, the clearness of the sky, the temperature, air pressure and the amount of precipitation that has fallen in the last twelve hours. These observations are sent by telegraph to Washington and other large centers, and a map is prepared showing the weather conditions in all parts of the country. By studying the map the officers are able to predict the weather from twenty-four to thirty-six hours in advance. About four-fifths of the predictions are correct. The station for Oklahoma is at Oklahoma City. Daily weather maps may be obtained free by people of

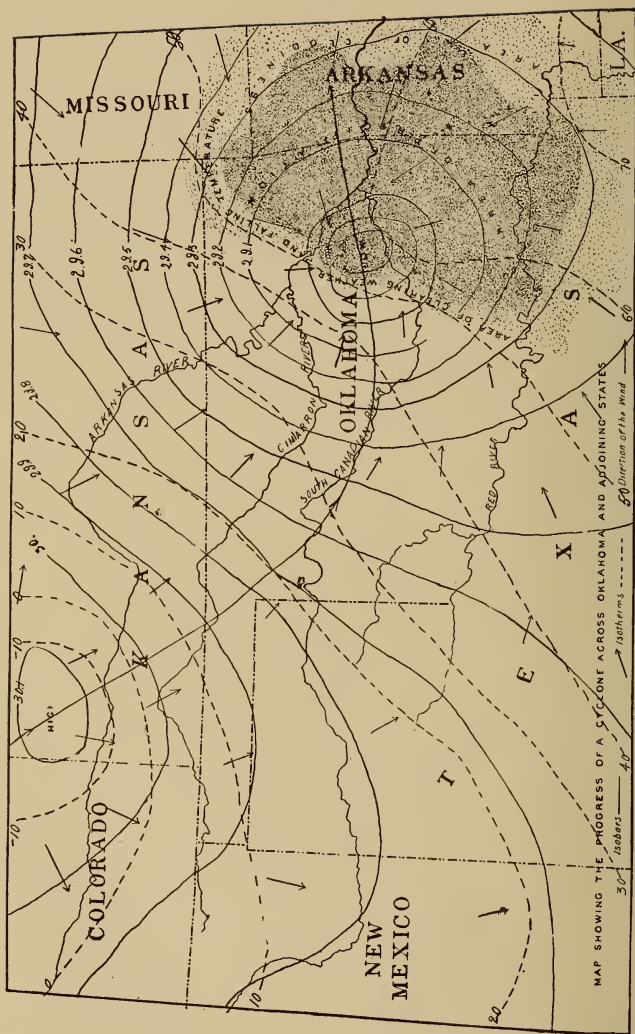


FIG. 37. A CYCLONIC AREA CROSSING OKLAHOMA

Oklahoma by sending to the Director of the Weather Bureau at Oklahoma City.

**Cyclones.** Oklahoma weather is said to be **cyclonic**. A **cyclone** is a disk of air, hundreds of miles in diameter, covering several states, and about two miles thick, lying upon the surface of the earth. At the center of this area is a center of **low pressure**, where the heated air is constantly rising. Cooler air from areas of high pressure without the cyclonic area flows in along the ground, ascends at the center and flows upward with a spiral twist in the opposite direction from the hands of a clock.

In addition to this circular motion the cyclone as a whole is moving across the country at the rate of 20 to 30 miles per hour. The direction is usually eastward. These cyclones pass over Oklahoma usually at intervals of from three to seven days. During the passage of a cyclone over Oklahoma the weather usually changes several times. As the air in the area of low pressure ascends it is cooled, the moisture is condensed and clouds are formed. Rain begins to fall. Thunder storms and hail are frequently produced. After the storm center or low pressure area has passed, the wind changes to the north, the clouds disappear and the sky is clear and the weather cooler for several days. Fig. 37 shows the progress of a cyclone across Oklahoma.

Most of the Oklahoma storms originate either in the northwestern part of the United States and pass southeast, or in the New Mexico region and pass northeast. The former are the "northers" or "blizzards" in winter, and the latter cause most of our thunder storms and tornadoes. After crossing our State the storms pass eastward across the Mississippi Valley; and many of them



swing to the northeast, cross the Great Lakes and turn down the St. Lawrence Valley. Most storms are beneficial, because they bring rain, without which vegetation could not exist. Only occasionally is the State visited with destructive storms, such as a tornado, hailstorm or cloudburst.

**Climate.** Climate is the sum of the weather for a number of years. The principal causes which influence cli-

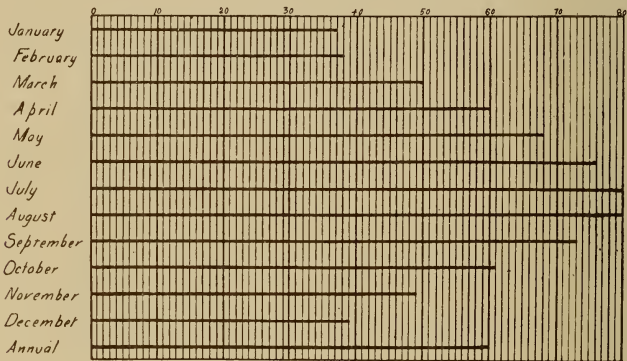


Chart Showing Average Monthly Temperatures in Oklahoma

FIG. 38. CHART SHOWING THE MONTHLY TEMPERATURE OF OKLAHOMA

mate are: *Latitude*, or distance from the equator; *altitude*, or distance above sea level; direction of the prevailing winds; distance from large bodies of water; *humidity*, or amount of moisture in the air; *ocean currents*; and *mountains*.

Countries which are located near the equator have a warm or torrid climate, but near the poles the climate is frigid. Oklahoma is situated midway between the equator and the poles and has a temperate climate.

**Temperature.** Temperature changes with altitude about one degree for every 65 feet. The tops of high mountains are always cold, even those near the equator. Western Oklahoma is nearly 5,000 feet above sea level and the climate is much cooler than in the eastern part of the State, where the altitude is less than 1,000 feet. Fig. 38 shows the monthly temperature of Oklahoma.

**Winds.** Winds bring high or low temperature and moisture and consequently affect climate. The cold north

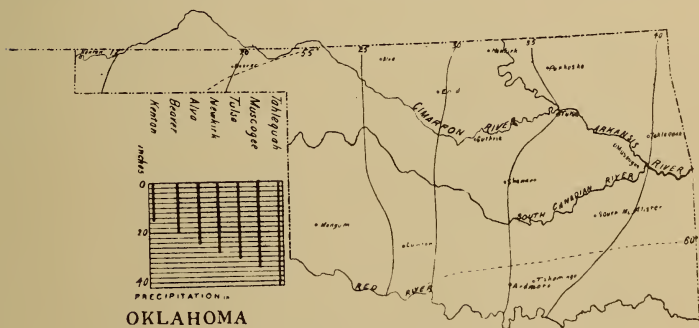


FIG. 39. CHART SHOWING THE MEAN ANNUAL PRECIPITATION IN OKLAHOMA

winds make the winter climate of Oklahoma colder than it would otherwise be. The hot southwest winds in summer bring excessive heat from the heated plains. Large bodies of water temper the climate and make changes less frequent. The nearest large body of water to Oklahoma is the Gulf of Mexico, about three hundred miles distant. The influence of the Gulf is felt especially in the southern and eastern parts of the State, where the rainfall is heavy and the temperature less changeable than further north and west.

**Humidity.** The humidity of Oklahoma decreases from east to west. The greater part of the State is in what is known as the humid region of the United States. The extreme western counties only are in the arid region. The climate in the interior of continents is spoken of as a **continental climate**. It is subject to frequent changes. Near the oceans, where changes are less frequent, the climate is known as an **oceanic climate**. The climate of

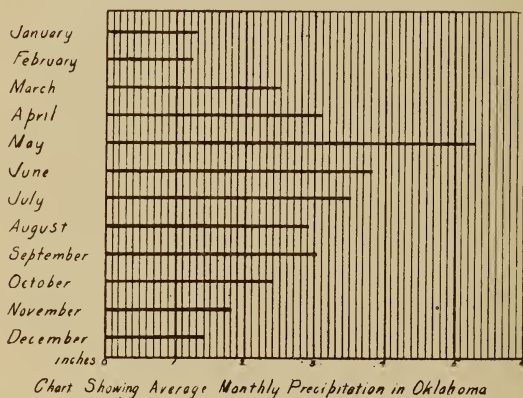


FIG. 40. CHART SHOWING THE AVERAGE MONTHLY RAINFALL IN OKLAHOMA

Oklahoma is continental. The almost constant breezes purify the air and make it very healthful.

**Rainfall.** The rainfall of Oklahoma varies from place to place, from year to year, and from season to season. The chart shown in Fig. 39 shows the mean annual rainfall for the past seventeen years. It will be seen that the rainfall steadily decreases from east to west. Snow rarely falls in southeastern Oklahoma, but in the north-

ern part of the State it sometimes occurs. Fig. 40 shows the average monthly rainfall in Oklahoma.

The following table shows the mean annual rainfall for the State by months for the past seventeen years:

Station.	EASTERN DIVISION.	Inches.
Durant .....		40.41
Tahlequah .....		43.91
Muskogee .....		37.28
Tulsa .....		34.65
Holdenville .....		37.95
Webber Falls .....		38.74
Fairland .....		43.04

Station.	CENTRAL DIVISION.	Inches.
Ardmore .....		37.13
Chickasha .....		30.76
Guthrie .....		31.50
Kingfisher .....		29.50
Newkirk .....		32.80
Oklahoma .....		30.96
Pawhuska .....		41.03
Shawnee .....		33.08

Station.	WESTERN DIVISION.	Inches.
Arapaho .....		28.07
Alva .....		28.58
Fort Sill .....		31.59
Kenton .....		15.74
Mangum .....		26.23
Temple .....		29.27
Weatherford .....		26.39

## RAINFALL BY MONTHS.

Month.	Inches.	Month.	Inches.
January .....	1.26	July .....	3.56
February .....	1.24	August .....	2.97
March .....	2.41	September .....	3.04
April .....	3.07	October .....	2.43
May .....	5.31	November .....	1.83
June .....	3.82	December .....	1.47

These figures show that the greater part of the rainfall occurs during the spring and summer months, i. e., during the growing season.

**Oklahoma Climate.** Oklahoma has a bright and sunny climate and sufficient rainfall for vegetation, but is not so humid as to be unhealthful. The amount of sunshine and the dry cool air are all favorable to health. As a result, Oklahoma is a healthful State. Its low death rate is due largely to its climate.

## QUESTIONS AND EXERCISES

1. What is weather?
2. What is climate?
3. What are the chief factors which go to make up weather?
4. What is temperature? With what instrument is it measured?
5. What do you understand by maximum, minimum, and mean temperatures?
6. What is wind?
7. What is meant by humidity?
8. What is meant by precipitation?
9. Study the map on page 69, and find out what the precipitation of your special locality is.



10. Study the same map and try to tell why western Oklahoma gets less rainfall than eastern Oklahoma.

11. What is low pressure? High pressure?

12. Study Figure 37. Where is the center of low pressure? In what direction is the wind flowing east of this center? West? South? Where is the area of clouds? The area of clear weather? Where do the storms occur? .

13. What is cyclonic weather? A cyclone?

14. What are some characteristics of a continental climate compared with an oceanic?

## CHAPTER VII.

### VEGETATION AND ANIMAL LIFE.

**Flora and Fauna.** The **flora** of a region includes all the plants, and the **fauna** all the animals found there. The plant life of a region is more directly dependent upon climatic conditions than the animal life, for plants



FIG. 41. UP-LAND TIMBER IN EASTERN OKLAHOMA

cannot move from one place to another as animals can. The chief factors affecting the flora of a country are: the amount and the distribution of rainfall; the temperature; and the character of the soil. The distribution of animal life depends chiefly upon the distribution of plants and the abundance of other animals.

**Flora of Oklahoma.** Eastern Oklahoma lies in the timbered region of the United States; western Oklahoma is in the prairie region. The line of separation of forest and prairie corresponds roughly to the line which separates the Sandstone Hills from the Redbeds Plains; and lies east of the main line of the Santa Fe railroad. No hard and fast lines can be drawn, however, for there are



FIG. 42. A SAW MILL IN EASTERN OKLAHOMA

considerable areas of prairie east of this line, and some forest areas are found west.

**Trees.** The trees of eastern Oklahoma are the ordinary forest species found in the Mississippi valley. On the hills the principal trees are several species of oak and hickory shown in Fig. 41, besides ash, persimmon, sassafras, pine and cedar. A saw mill is shown in Fig. 42. Along the valleys, cottonwood, elm, maple, sycamore, willow, hackberry, walnut, bois d'arc, pecan and sweet gum, are most common. Several species of wild plum

and wild cherry, mulberry, honey locust, haw, crabapple and wild grape are found. Fig. 43 shows piles of cross ties and lumber at a station. Fig. 44 shows a rail fence and deadened timber in a clearing in eastern Oklahoma.

In the western half of the State trees are found usually only along the streams or among the sand hills. The level uplands are grass-covered. Cottonwood, elm, hackberry, chinaberry, walnut and willow are the prin-



FIG. 43. PILES OF CROSSTIES AND LUMBER AT BENNINGTON

cipal trees along the streams. Fig. 45 is a dwarfed elm. Fig. 46 shows cottonwood and elm trees. On the flat prairies and along some of the streams in the western counties is found the thorny mesquite. Black jack, post oak, hackberry and hickory grow in the sand hills. On the High Plains in the extreme western part of the State there are very few trees even along the streams, but even here an occasional low elm or dwarf cottonwood or willow may be found.

**Grasses.** There are a great many species of native grasses in Oklahoma. In the eastern and central parts of the State the grasses grow tall. The chief grass in this region is commonly known as "blue stem." On the High Plains the most common form is called "buffalo grass." Buffalo grass grows only two or three inches high; but it stands very thick and forms a heavy sod carpet on the ground. Western Oklahoma is sometimes

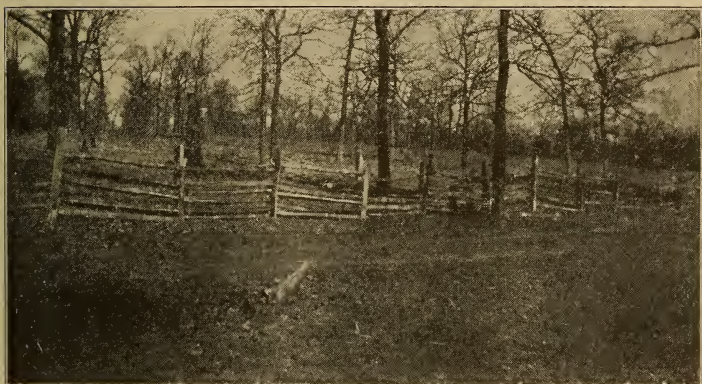


FIG. 44. RAIL FENCE AND DEADENED TIMBER

known as the "short grass country." The principal cultivated grasses are alfalfa and Bermuda grass. Clover, orchard grass and blue grass are cultivated in lawns, and timothy is grown in the eastern counties. In the sandy country on the High Plains is found the so-called sage brush and the spiny yucca. Several species of cactus, also, grow on the plains.

**Mistletoe.** The mistletoe grows everywhere in Oklahoma except in the northwestern part of the State. It is



a parasite and flourishes best on elm trees. The branches are short and stubby, the leaves dark green and in winter the berries are white. The beautiful dark green clusters with white berries form handsome decorations. Great quantities of mistletoe are every year shipped to northern markets at Christmas time. The mistletoe is usually accepted as the state flower of Oklahoma.

**Fauna of Oklahoma.** Oklahoma contains a very diverse



FIG. 45. A DWARF ELM ON THE HIGH PLAINS

fauna. The borderland of forest and prairie has helped to promote animal migration. Many of the largest and most useful of the wild animals have been destroyed by man so that now only the smaller and less important remain.

**Wild Animals.** Buffalo once roamed in countless numbers over our plains, but they have practically all been killed. At the present time three small herds are kept in

captivity, one herd at Pawnee, one at Bliss, and one in the Forest Reserve in the Wichita Mountains, Fig. 47.

Elk were once plentiful but they have long since disappeared. A few years ago there were still several droves of antelope on the High Plains but there are none now. Deer are found occasionally in the timbered country in eastern Oklahoma. Bears and panthers which were once common have about all disappeared. Gray wolves are



FIG. 46. COTTONWOOD AND ELM TIMBER ALONG A STREAM—  
WESTERN OKLAHOMA

occasionally found and coyotes are still common in certain localities in the central and in the western part of the State.

Jack rabbits and ground squirrels are common on the prairies, and cotton-tail rabbits, red squirrels and gray squirrels in the timber. Badgers, minks, and otters are occasionally found, but the beavers have all been destroyed. Muskrats live along the streams. Gophers are common and many colonies of prairie dogs are yet found

in the western part of the State. Wild cats, raccoons, opossums, and skunks are still to be seen in many regions.

**Birds.** There is a great variety of birds in Oklahoma. Among the flesh-eating birds are several species of owls, of which the barred owl, screech owl, monkey-faced owl, and prairie-dog owl are most common. A number of species of hawks, also, abound. The Mississippi kite is common in the western counties. Both the bald eagle and the



FIG. 47. BUFFALO HERD IN THE FOREST RESERVE,  
WICHITA MOUNTAINS

Photograph by Dedrick, Taloga, Okla.

golden eagle are found, and the turkey buzzard is common everywhere. Game birds are common. Quails are abundant, and prairie chickens and wild turkeys are still found in sparsely-settled localities. Ducks, geese, brants, cranes, snipe, plover, mud hens, curlew, and other migratory wildfowl are common at certain seasons of the year. Crows are found in the timbered country. There are many kinds of song birds both in the timber and on the

prairie, the most common of which are various species of sparrows, thrushes, orioles, blackbirds, doves, larks, warblers, fly catchers, and robins.

**Snakes and Lizards.** There are but few kinds of poisonous snakes in Oklahoma; the rattle snake, the copper-head and the water moccasin, and none of these is common. There are four forms of the rattlesnake in the State, the most common of which are known as the prairie rattler, the timber rattler, and the diamond rattler. All snakes except the poisonous ones are useful to man and should not be killed. Among these are the bull snake, spreading adder, water snake, black snake, king snake, blue racer, coach whip, garter snake, and house snake. Frogs and toads which are common are useful also. There are several species of small lizards, the largest of which is sometimes known as the "mountain boomer." It is really a chameleon and has the power of changing the color of its skin. There are two peculiar kinds of lizard in Oklahoma which bear the name of another animal. The "horned toad" is not a toad at all, but a lizard. It is much more common further west than in Oklahoma. The "joint snake" is a lizard also. Its tail, which is longer than the rest of its body, is composed of sutures which may be pulled apart. The animal may lose all its tail and still live.

**Turtles.** There are several varieties of turtles, both on land and in water. The most common land form is the box tortoise, sometimes known as the terrapin. The two most common turtles living in water are the soft-shelled and the hard-shelled turtle. Both kinds are used for food.

**Do Not Kill Snakes.** None of these small forms of an-

imals, except the poisonous snakes, are harmful to man. Most of them are very useful. They destroy countless numbers of harmful insects and small animals such as mice and rats. Only ignorant or cruel people now kill snakes, toads, lizards or turtles.

**Fishes.** The streams of Oklahoma abound with fish. Bass, perch, catfish, sunfish, trout and buffalo are the most abundant native species. German carp and crappie have been introduced into many streams and ponds.

### QUESTIONS AND EXERCISES

1. Define flora; fauna.
2. What factors affect the fauna of a country? The flora?
3. What part of Oklahoma is timbered?
4. Name the trees growing on the upland in eastern Oklahoma.
5. Name the principal species found in the valleys.
6. Where are the trees found in western Oklahoma?
7. Name the chief species.
8. What are the principal wild grasses? The cultivated grasses?
9. Name some plants found on the High Plains.
10. Describe the mistletoe.
11. Name some wild animals that are nearly extinct.
12. What are the most common wild animals in the State?
13. Prepare a list of all the birds you can think of that live in Oklahoma.
14. What are the poisonous snakes?
15. Name the non-poisonous snakes.
16. To what form of life do the horned toad and joint snake belong?
17. Why should non-poisonous snakes, toads, turtles and lizards not be killed?
18. Name the principal kinds of fish found in Oklahoma.



## CHAPTER VIII.

### LOCATION OF INDIAN TRIBES.

**Original Owners of Oklahoma.** By the provisions of the Louisiana purchase of 1803, all of Oklahoma except that part which lies west of the one hundredth meridian, came into the possession of the United States. The Osage Indians claimed all the land north of the South Canadian River, and the Quapaws all the land south of that stream. In 1817 both these tribes ceded their land to the general government.

**Homes of the Five Civilized Tribes.** At this time there were living in the southeastern part of the United States several Indian tribes—among others the Cherokees, Creeks, Seminoles, Choctaws and Chickasaws. The Cherokees lived in the country covered by the corners of the states North Carolina, South Carolina, Georgia, Alabama, Tennessee and Virginia. The Creeks, who knew themselves as the Muskogees, lived in western Georgia and Alabama. The Seminoles, a branch of the Muskogees, lived in southern Georgia and Florida. The Choctaws and Chickasaws lived in western Alabama and Mississippi.

As these southern states were settled these tribes retired before the encroachments of the white man, until finally they were confined to small reservations. At various times they sold their homes to the government and received in return certain lands in what is now Okla-

homa. By the terms of the treaties the land was to belong to the Indians forever.

**Migration of the Five Civilized Tribes.** Before the year 1820 the Cherokees had sold part of their land in North Carolina to the general government and received cession of land north of the Arkansas River in what is now northeastern Oklahoma. This included not only the old Cherokee Nation, but also the Osage, Pawnee, Ponca, Otoe and Tonkawa reservations and the so-called Cherokee Outlet or "The Strip."

In 1820 the Choctaw Indians gave to the government certain lands in Mississippi and received in lieu thereof lands in the Indian Territory, lying between the Canadian and Red rivers; and in 1832 the Chickasaws, a band of the Choctaws, came west and settled on the same land.

In 1825 the Creek Indians ceded to the United States their lands in Georgia and received, acre for acre, land lying north of South Canadian River extending north to the Cherokee possessions. In 1833 the Seminoles received a grant of land along the southern part of the Creek country, including everything between the North and South Canadian rivers, extending from a point near where Shawnee is now located, westward to the Texas line.

At the opening of the Civil war, the Five Civilized Tribes—the Cherokees, Creeks, Seminoles, Choctaws, and Chickasaws—owned all that is now Oklahoma except No Man's Land and Greer County. Texas claimed Greer County.

**Disposal of Land by the Five Civilized Tribes.** After the war, in 1866, all the tribes except the Cherokees, were forced to give up to the general government part of their territory. The Seminoles ceded to the United

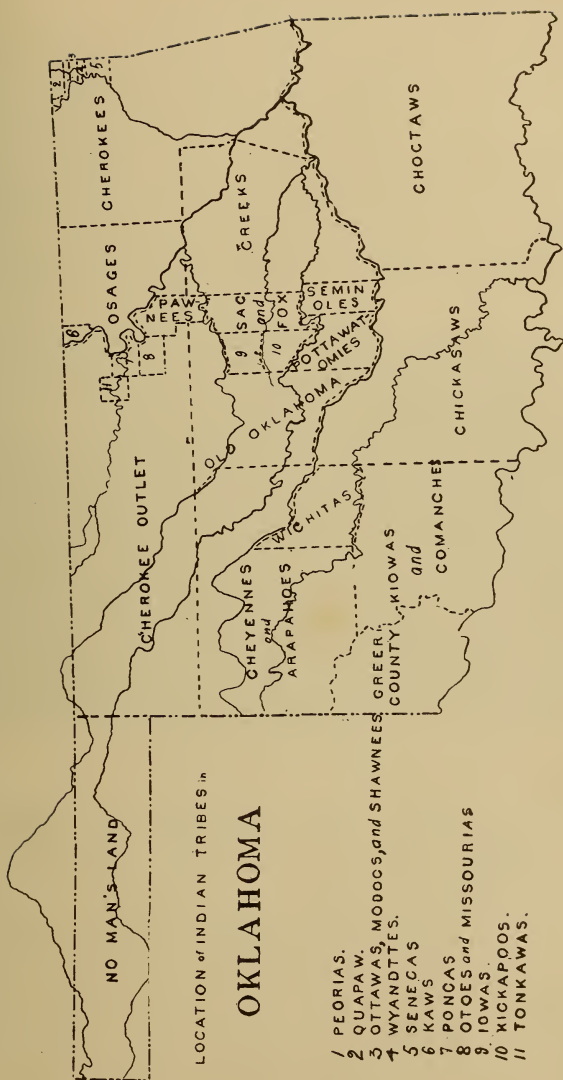


FIG. 48. A MAP SHOWING THE LOCATION OF INDIAN TRIBES IN OKLAHOMA BEFORE SETTLEMENT BY THE WHITES.

States all of their land between the North and South Canadian rivers, and bought from the Creeks 200,000 acres of land lying just east of their former possession. At the same time the Creeks ceded all the western part of their lands to the United States. The Choctaws and Chickasaws gave up their land west of the 98th meridian. The Cherokees divided their lands along the 96th meridian and authorized the United States government to



FIG. 49. WICHITA GRASS HOUSES

settle friendly Indians in the western part of the territory, known as the Cherokee Outlet. They still owned this land, however.

**Settlement of Friendly Indians in Oklahoma.** It was about this time that the government began to pursue the policy of bringing scattered tribes or remnants of tribes from other parts of the country and settling them on this land, which had been given up by the Five Civilized Tribes. The eastern part of the State, which was re-

tained by the Five Civilized Tribes, was afterward known as Indian Territory. The western part, settled by various tribes, was called Oklahoma.

In 1867 the Sac and Fox Indians ceded their lands in Wisconsin to the United States government and received 750,000 acres of land between the Cimarron and North Canadian rivers. The same year several bands and remnants of tribes settled in the northeast corner of the



FIG. 50. SAC AND FOX BARK HOUSE

Cherokee country in the region east of the Neosho River. Among these were the Wyandottes, Quapaws, Miamias, Senecas, and Peorias. The Pottawatomies came from Indiana and Michigan the same year and received land between the two Canadian rivers, extending west from the Seminole country to the Indian meridian. The Kiowas and Comanches, two tribes of "Wild Indians of the Plains," were the same year assigned a reservation between the Washita and Red rivers extending west from



the Chickasaw country to the North Fork of the Red River.

In 1869 the Cheyennes and Arapahoes, also Plains Indians, were given lands between the 98th and 100th meridians, extending from the Washita River north to the Cherokee Strip.

In 1872 the Osages sold their land in Kansas and bought of the Cherokees a tract bounded by the 96th



FIG. 51. CONICAL TEPEES OF THE COMANCHES

meridian, the Kansas line, the Arkansas River and the Creek country. They, in turn, sold to the Kaw Indians, who came from eastern Kansas, the western part of their country, including that part of what is now Kay County which lies east of the Arkansas River. The same year the Wichitas and Caddos ceded lands which they owned in Texas and Louisiana to the government and received a tract between the Washita and South Canadian rivers extending from the 98th meridian to a line 38 miles west.

The Pawnees in 1875 sold their land in Nebraska and received twelve townships lying between the Arkansas and Cimarron rivers in what is now Pawnee County. In 1881 the Otoe, Missouri, and Ponca Indians came from Nebraska and settled on reservations in what is now eastern Kay and Noble counties.

In 1883 the Iowas from Iowa and the Kickapoos from Mexico received tracts of land in what is now Lincoln County, the former settling north of Deep Fork, the latter south.

Fig. 48 shows the location of the various tribes in Oklahoma before any land was opened to settlement.

The Apache Indians, who were once the terror of Arizona under Geronimo, are now held at Fort Sill Military Reservation in Comanche County, where they have been for six-



FIG. 52. INDIAN PAPOOSE

teen years under military supervision and direction. The Apaches are virtually prisoners of war and do not own any land. There are about 230 Apaches in this group.

**Mode of Life.** For many years after settling on their Oklahoma reservations these Indians retained their prim-

itive customs. Each tribe had its own peculiar form of house. The Wichitas lived in grass houses, as shown in Fig. 49, the Sac and Fox and Kaw Indians had bark houses, such as those in Fig. 50, and the wild Indians of the Plains used the conical tepee pictured in Fig. 51. Later the government built houses on the allotments. Today the greater part of the Indians live in wooden houses and are engaged in farming and stock-raising. Fig. 52 shows an Indian papoose.

### QUESTIONS AND EXERCISES

1. What Indian tribes originally occupied the territory now comprised in Oklahoma?
2. Where did the Five Civilized Tribes live?
3. When did each of these tribes come west?
4. Where did each tribe settle?
5. What land was given up by each tribe after the Civil War?
6. What policy did the government establish regarding the location of scattered tribes?
7. Give the original home and the location of the land in Oklahoma given to the Sac and Foxes; the Pottawatomies; the Kiowas and Comanches; Cheyennes and Arapahoes; Osages; Kaws; Pawnees; Otoes and Missouris; Iowas; Kickapoos; Apaches.

## CHAPTER IX.

### EARLY HISTORY AND SETTLEMENT.

**Old Oklahoma.** After the various Indian tribes from different parts of the United States had been settled on their reservations there still remained a tract of land in the center of the territory containing about 2,000,000 acres, which was unoccupied by any tribe. This tract extended from the Indian meridian west to the 98th meridian and from the Cherokee Strip south to the South Canadian River. (See Fig. 48.) It was called the Oklahoma country. The name was derived from two Choctaw words, "Okla," meaning people or tribe, and "Homa," meaning red. The word Oklahoma, then, means red people or red tribe.

**Agitation Leading to the Opening of Oklahoma to Settlement.** For a number of years this country was occupied by stockmen only. Beginning about 1875 an agitation was commenced to induce the government to open the lands to settlement. It was claimed that it was no longer Indian land, but a part of the public domain. Beginning with the year 1880 determined efforts were made to force the opening of the Oklahoma country. Boomer colonies were organized along the north line of the Cherokee Strip and many caravans of white-topped "prairie schooners" moved south to the "promised land."

Many men had part in this agitation, but the one to whom most credit is due was Capt. David L. Payne, the

prince of Oklahoma boomers. Five times he led colonies of settlers into Oklahoma. He was arrested a number of times and his followers put out of the country by United States troops. He was tried in court for trespassing, but was cleared of the charge, the Court holding that Oklahoma was public domain. Capt. Payne died at Wellington, Kansas, in 1884, five years before the country was opened.

**Opening of Oklahoma.** Agitation continued, and finally



FIG. 53. THE OPENING OF OKLAHOMA

Congress passed an Act authorizing the settlement of Oklahoma. The President issued a proclamation and at noon on April 22, 1889, the country was opened to settlement. The opening was conducted on the horse race plan, as shown in Fig. 53, every contestant running for a piece of land and taking what he could get. In many cases two or more persons got on the same tract of land. Many contests followed, often leading to bloodshed and in many cases long-continued law-suits. The counties of Logan, Payne, Oklahoma, Cleveland, Canadian and King-



fisher were framed from old Oklahoma. Additions to all these counties have been made from lands acquired from time to time by the opening of adjacent reservations. A territorial government was inaugurated. Geo. W. Steele of Indiana was appointed the first Governor.

**No Man's Land.** In 1890 Beaver County, sometimes known as the Neutral Strip, No Man's Land, or Cimarron Territory, was added to Oklahoma. This strip of land, 167 miles long and 35 miles wide, containing 3,682,360 acres, extends west from the main part of Oklahoma. It once belonged to Mexico and afterward was a part of the Republic of Texas, but was not admitted as a part of the State of Texas because it lies north of  $36^{\circ} 30'$ , the northern limit of slave territory. For a number of years it was not a part of any state or territory. It was settled, however, and the citizens met, organized a government, and named the country Cimarron Territory. They elected officers and even sent a delegate to Congress, but he was not recognized.

**Other Reservations.** The Territory of Oklahoma having been organized the government began to pursue the policy of opening to settlement other adjacent reservations. Treaties were from time to time made with the various tribes. The Indians received allotments of land, usually 160 acres for each man, woman and child. The remainder, usually the poorest land, was then thrown open to settlement by white men.

On Sept. 22, 1891, the Sac and Fox, Iowa and Pottawatomie reservations in eastern Oklahoma were opened for settlement. The reservations contained 1,282,434 acres. This opening was also on the horse race plan and much dispute and many contests arose. Portions of Pottawat-

omie, Lincoln, Cleveland, Logan, Oklahoma and Payne counties were formed from these reservations.

The Cheyenne and Arapaho country in western Oklahoma, embracing 4,297,771 acres, was opened on April 19, 1892. This country extends from old Oklahoma west to Texas and lies south of the Cherokee Strip. All or part of Blaine, Washita, Custer, Dewey, Roger Mills, Ellis, Beckham, Canadian and Kingfisher counties are included in the reservation. The horse race plan was followed, but the country was so large that only a small part of it near the border was settled on the day of the opening, so that contests were not so common as in the other reservations.

**The Cherokee Strip.** The Cherokee Strip, containing 6,014,239 acres, was opened to settlement September 16, 1893. This is the largest reservation ever opened in Oklahoma, and contains some of the finest agricultural land in the State. In the opening of this reservation an attempt was made to regulate the abuses that had marked former openings. Booths were established along the border. No one was permitted to file on land who could not produce a booth certificate to prove that he was not a "sooner," a term applied to persons in Oklahoma who had entered upon land before it was legally opened to settlement. The booth system was not a success and many contests occurred. Pawnee, Noble, Kay, Grant, Garfield, Alfalfa, Major, Woods, Woodward, and Harper and part of Payne and Ellis counties were in the Cherokee Strip.

On May 23, 1895, the Kickapoo lands, containing 206,662 acres located in eastern Oklahoma, were opened to settlement. The horse race was the feature of the opening and many contests resulted. The Kickapoo country was

divided between Lincoln, Oklahoma, and Pottawatomie counties.

**Greer County.** By a decision of a supreme court of the United States rendered March 16, 1896, Greer County, containing 1,511,566 acres was added to Oklahoma. This country had been claimed as a part of Texas and that state had exercised jurisdiction over the disputed territory. The point at issue dated back to the time of the Louisiana purchase, and depended upon whether the North Fork or South Fork of Red River was the main branch of that stream. Greer, Jackson and part of Beckham counties are in this territory.

**The Kiowa Country.** The Kiowa, Comanche, and Wichita reservations, comprising nearly 4,000,000 acres, were opened to settlement August 6, 1901. For the first time the race horse was done away with and the drawing plan was adopted. Every applicant was required to register, the names were placed in a box, then drawn out, numbered, and the applicant allowed to file in the order of the number thus drawn. All of Caddo, Kiowa, Comanche and Tillman counties, and parts of Jefferson, Stevens, Grady, Canadian and Blaine counties, belonged to this reservation.

Certain areas in these reservations were reserved by the Kiowa and Comanche Indians and known as pasture reserves. These were opened to settlement in 1907. This land was sold by private bids.

The Kansas reservation and portions of the Ponca reservation have been attached to Kay County. Parts of the Ponca and Otoe and Missouri reservations were added to Noble County. Pawnee County received portions of the Otoe and Missouri reservations. In these reservations all

the land was allotted to the Indians, so none of it was subject to settlement by white men.

The Osage reservation now forms a county. This land belongs to the Osage Indians and they have divided the land pro rata, each Indian receiving 659 acres.

**Indian Territory.** On the Indian Territory side of the State conditions were very different. Here all the land had belonged to the Five Civilized Tribes ever since they

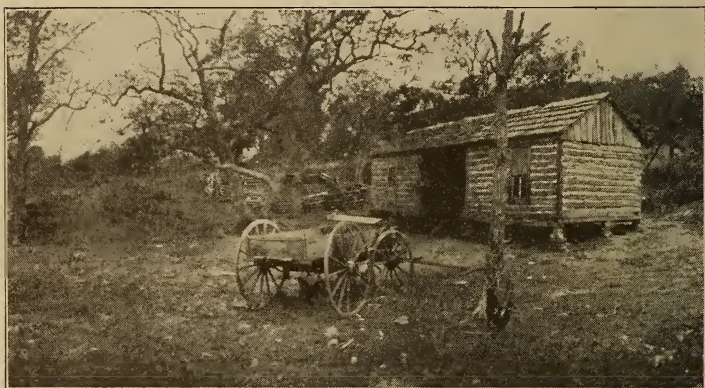


FIG. 54. INDIAN CABIN, EASTERN OKLAHOMA

came west 70 years before. According to the ancient treaties, "as long as the sun shall shine; as long as the grass shall grow; as long as water shall run; the land shall be to you and your children." For many years few white men were permitted to live in the Indian country. After the advent of railroads, however, white settlers became more numerous. Towns began to spring up. Each Indian tribe, however, retained its own government, made its own laws, and managed its own schools.

Some of the Indians had fine homes, but the greater part of them lived in little cabins near some mountain spring, such as shown in Figs. 54 and 55.

**Work of Dawes Commission.** When the people of Oklahoma began the agitation for Statehood, Congress appointed a commission known as the Commission to the Five Civilized Tribes, popularly known as the Dawes Commission, to settle up the affairs of these nations. This



FIG. 55. INDIAN CABIN IN THE TIMBER

Commission has been employed for a number of years in this work. It has virtually stood in the light of an administrator to several thousand minor heirs. Rolls of citizens of the various tribes have been prepared. The land has been surveyed and appraised. Each citizen has received his allotment of land. Tribal relations have about all been dissolved.

When the Indians moved west many of them held Negro slaves. These slaves were made free by the Fourteenth



Amendment to the United States Constitution. These Negroes, known as freedmen, have always lived with the Indians in the various nations. When the land was divided the freedmen received allotments also. Much of the best land in Oklahoma is now owned by Negroes who were once slaves.

**Admission of Oklahoma.** When this had been done Congress passed an Enabling Act, permitting the people



FIG. 56. SOD HOUSE IN WESTERN OKLAHOMA

of the two territories to frame a State government. Delegates were elected and a Constitutional Convention held. A constitution was written, which was adopted by the people by a large majority. November 16, 1907, the State of Oklahoma was admitted as the 46th State of the Union.

**Character of Settlers.** The first settlers of Oklahoma were from all parts of the Union. They were hardy, industrious and energetic, used to privations and hardships.

Few of them had money, but they had what was better—courage and ability. They came to Oklahoma, not through love of adventure, but in order to obtain a home for themselves and their children. For the first few years they lived in a very primitive manner. In the prairie country the settler's first home was usually a dugout or sod house. Types of early buildings are shown in Figs. 56 and 57. In the timber a log house would be built.

Usually the settlers were many miles from the railroad and all provisions and farm products had to be hauled in wagons. Ox teams were often used in farming, as shown in Fig. 58. In a few years the country became more prosperous. Railroads were built and towns sprang up. The dugouts and sod houses were abandoned and substantial



FIG. 57. A CLAIM SHANTY IN  
WESTERN OKLAHOMA

stone or frame houses built. In most parts of Oklahoma today the farms are as well improved as in many of the older states. Fig. 59 shows a modern up-to-date Oklahoma farm house.



FIG. 58. BREAKING GROUND IN THE TIMBERED COUNTRY

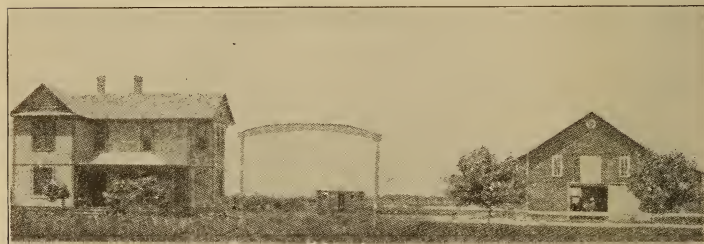


FIG. 59. MODERN OKLAHOMA FARM HOUSE

## QUESTIONS AND EXERCISES

1. Locate old Oklahoma.
2. What does the word Oklahoma mean?
3. When was Oklahoma opened for settlement?
4. Who was the first Governor?
5. Give a brief history of No Man's Land.
6. What reservations were opened to settlement in 1891?
7. When was the Cheyenne and Arapaho country opened?
8. Describe the opening of the Cherokee strip.
9. What is a "sooner"?
10. When was the Kickapoo country opened?
11. How did Oklahoma secure Greer County?
12. How was the Kiowa and Comanche country opened?
13. Which was the last reservation to be opened to settlement?
14. How was the land in Indian Territory disposed of?
15. When was Oklahoma admitted into the Union?
16. What was the character of the first settlers?

## CHAPTER X.

### EDUCATION.

**Free Education.** Education is free in Oklahoma. Free public schools in city and country are open to all children between the ages of 6 and 21. All the larger towns and many of the counties have free high schools. On completing the high school the young man or young woman may enter the State University, which is the capstone of the educational system of the State, and there secure without tuition as good an education as the country affords.

**School Laws.** Oklahoma has a magnificent endowment of school land. When the lands of the Territory of Oklahoma were open to settlement, sections 16 and 36 in each township were reserved by the government to be used for the benefit of the schools. In certain parts of the Territory section 13 has also been reserved. This land has been leased and the income derived has been used by the State for the benefit of its public schools. Certain grants of land aggregating more than 1,000,000 acres in the western part of the State were set apart for the benefit of the higher institutions of learning, including the University, the Agricultural College and the Normal Schools. One of the greatest problems before the people of Oklahoma is that of the disposal of the school land. Whether the lands are sold, or whether the State keeps the land and leases it, the income will continue to be used for the benefit of the school children of the State. There is no



school land in the Indian Territory part of Oklahoma. All the land in that region belonged to the Indians and was not government land. In lieu of public land, Congress donated to the State school fund \$5,000,000.

**State Superintendent.** The educational interests of the State are in charge of the State Superintendent of Public Instruction, who is elected by the people. He is a member of the State Board of Education, the Board of Regents of the State Normal Schools, and other State Boards. He outlines the educational policy of the State, proposes school legislation, consults with county and city superintendents, and has general oversight of all educational matters in the State.

**Country Schools.** The country schools of each county are in charge of a County Superintendent of Public Instruction. He organizes new school districts, visits each school in the county at least once a year, has charge of the summer normal institute, conducts examinations and issues certificates to teachers. Three grades of certificates are issued: a first grade, good for three years; a second grade, good for two years; and a third grade, good for one year. Each teacher in the county is supposed to attend the county normal institute, which is held during the summer and continues not less than



FIG. 60. STONE SCHOOL HOUSE,  
KAY COUNTY

two nor more than four weeks. Each county is divided into a number of school districts, each of which is under the direction of a board composed of three members, who hire a teacher and look after the general interests of the school. One member of the board is elected each year at the annual school meeting. All the voters of the district may attend this meeting and have a voice in the election of members of the board, the length of school term and



FIG. 61. SCIENCE HALL, STATE UNIVERSITY

the amount of tax to be levied. Fig. 60 shows a stone schoolhouse in Kay County.

**City Schools.** The public schools in the cities are under the control of a Board of Education elected by the people. This board employs a city superintendent, who has direct charge of all school matters, a high school principal, as many ward principals as there are ward buildings and high school and grade teachers. These city schools are graded. Children enter first the kindergarten, then pass

through the various grades. After completing the eighth grade they may enter the high school, which includes the ninth, tenth, eleventh and twelfth grades. On completing the high school they may enter the State University.

**State Schools.** The State University (See Fig. 61) is located at Norman. In it young men and women receive training in higher learning, such as the languages, mathematics, history, the sciences, medicine, law, pharmacy, music and engineering. Graduates of accredited



FIG. 62. BUILDINGS AT THE A. AND M. COLLEGE

high schools and academies, the University Preparatory Schools and the Normal Schools are admitted to the University without examination.

The Agricultural and Mechanical College is at Stillwater. (See Fig. 62.) It is primarily a school for training in agriculture and the mechanic arts. The greater part of the students are from farms. The state experiment station is in connection with it. Oklahoma has six normal schools, located, respectively, at Edmond, Alva, Weatherford, Tahlequah, Durant and Ada. These schools are intended for the training of teachers. University

preparatory schools are located at Tonkawa and Claremore. The work offered is the same as that given in the high schools, the object being to train students for the State University. The School of Mines is at Wilburton and the Colored Agricultural and Normal University at Langston.

**Church Schools.** There are a number of denominational colleges in different parts of the State supported by the various churches. Kingfisher College (Congregational) at Kingfisher is one of the oldest. Bacone (Baptist), Spaulding (Methodist) and Nazareth (Catholic) are at Muskogee; Henry Kendall (Presbyterian) at Tulsa, Epworth (Methodist) and St. Mary's (Catholic) at Oklahoma City, Oklahoma Christian University at Enid, Sacred Heart (Catholic) at Sacred Heart, Hargrove College at Ardmore, and a Presbyterian college at Durant. Besides these there are a number of academies, seminaries, private schools, conservatories of music and business colleges in various parts of the State.

**Religious Denominations.** The various religious denominations are represented in Oklahoma. The value of church property is estimated at six million dollars.

A high moral tone pervades the citizenship of Oklahoma. By a provision of the constitution, ratified by a vote of the people, the manufacture and sale of intoxicating liquors is prohibited for 21 years. Sobriety, morality, industry and home-making are dominant traits. Oklahoma has a higher percentage of native-born American citizens than most states, and the general moral and religious conditions are above the average.

## QUESTIONS AND EXERCISES

1. Who may attend free schools in Oklahoma?
2. What schools are free to the people of the State?
3. Where are the school lands located?
4. What sections are reserved in each township?
5. What are the duties of the State Superintendent?
6. What are the duties of the County Superintendent?
7. How are city schools graded?
8. Locate the State schools.
9. For what purpose is each State school established?



## CHAPTER XI.

### GOVERNMENT.

**Constitution.** The organic law of Oklahoma is the Constitution, which was adopted by a popular vote of the people September 17, 1907. The Oklahoma Constitution is the most up-to-date of any of the state constitutions and contains a number of provisions not usually written into state constitutions. Among others may be mentioned the initiative and referendum, provisions for the control of corporations, prohibition of the liquor traffic and compulsory primary elections. Political power is vested in the people and the Constitution may be amended by a majority vote whenever the people desire.

Oklahoma is represented in the Congress of the United States by two Senators and five members of the House of Representatives. Robert L. Owen of Muskogee and T. P. Gore of Lawton were the first United States Senators elected from Oklahoma.

The government of Oklahoma is vested in three departments—the legislative, which makes the laws; the executive, which enforces the laws, and the judicial, which interprets the laws and applies them to individual cases.

**Legislative Department.** The legislative department is composed of two bodies. The House of Representatives is composed now of 109 members elected by the people for two years. Each county has at least one representative;

the larger counties have two or more. The Senate is composed of 44 members elected from districts for a term of four years. Usually several counties compose a senatorial district. The presiding officer of the House is called the Speaker. The Lieutenant Governor presides over the Senate. Laws must pass both the House and the Senate and be signed by the Governor.

**Executive Department.** The executive department consists of a Governor, Lieutenant Governor, Secretary of State, Attorney General, Auditor, Treasurer, Superintendent of Public Instruction and State Examiner and Inspector, all of whom are elected by a popular vote for a term of four years.

The following are the names of the principal executive officers of Oklahoma elected at the first State election:

Governor .....	Charles N. Haskell
Lieutenant Governor .....	George W. Bellamy
Secretary of State.....	William Cross
Attorney General .....	Charles West
Auditor .....	M. E. Trapp
Treasurer .....	James A. Menefee
State Superintendent .....	E. D. Cameron
State Examiner and Inspector..	Charles A. Taylor

Other executive officers elected by the people are Mine Inspector, Commissioner of Labor, Commissioner of Charities and Corrections, Commissioner of Insurance and three Corporation Commissioners. The Governor appoints a number of State officers, including Oil Inspector, Bank Examiner, State Librarian, Fish and Game Warden, Grain Inspector, Adjutant General. Several state boards and commissions are established by law, including the Board of Education, Board of Agriculture, Pharmaceuti-

cal Board, State Board of Examiners, Text Book Commission, Geological Survey Commission, Medical Board and the Boards of Regents of the various institutions of higher learning.

**Judicial Department.** The judicial power is made up of a system of courts of various ranks. The lowest are justice of peace and police courts, of which there is at least one in each township and town. Next come the 75 county courts, one in each county. Several counties are combined into a district under the jurisdiction of a district judge. There are 21 district courts. The highest court in the State is the Supreme Court. It is composed of five judges, one of whom is Chief Justice.

**Local Government.** The people in each county elect their own county officers, consisting of a County Judge, Sheriff, County Clerk, Attorney, Treasurer, Register of Deeds, Superintendent of Schools, Surveyor, Clerk of District Court and three Commissioners.

Counties are divided into townships. Township officers are a Trustee, Clerk, Treasurer, Constables and Road Overseers.

Cities have their own local government and elect their own officers. The executive officer is the Mayor. The legislative officers are councilmen, of whom two are elected from each ward. The council passes ordinances for the government of the city which in a way correspond to the laws passed by the State Legislature. The judicial department has a police judge, who tries small offenses.

## QUESTIONS AND EXERCISES

1. What is the organic law of the State?
2. When was it written? When adopted?
3. Name some unusual provisions in the Oklahoma Constitution.
4. Name the Oklahoma Senators.
5. Give the functions of the three departments of government in Oklahoma.
6. Of what two bodies is the State Legislature composed?
7. How many members are there in the House of Representatives? How many Senators?
8. Who is your Representative? Your Senator?
9. Name the executive officers.
10. Name the chief State boards.
11. Of what does the judicial department consist?
12. Name the county officers in your county.
13. Name the officers in your city or township.

## CHAPTER XII.

### AGRICULTURAL RESOURCES.

In Oklahoma more persons are engaged in some form of agriculture than in all other occupations combined. The mild and favorable climate and the great diversity of fertile soil make possible the raising of a large variety of farm products.

**Soil Areas.** The State has a number of soil areas which in a general way correspond with the Topographic Regions outlined in Chapter II. With the exception of the rougher parts of the four mountain regions and certain localities among the Sandstone Hills and Gypsum Hills, there is very little of Oklahoma that may not be successfully cultivated.

At the present time not more than one-third of the agricultural resources of the State have been developed. A great part of the most fertile land in Oklahoma has not yet been put under cultivation. This is especially true in the eastern counties, where the greater part of the land belongs to citizens of the Five Civilized Tribes. As the condition of soil, underground water and climate vary from place to place, the forms of agriculture vary, so that there are well-defined crop belts in various parts of the State. The positions of these crop belts are determined largely by three sets of factors: Rainfall, temperature and character of the soil.

**Soil.** Soil consists of broken-up rock fragments mixed



with decayed vegetable and animal substances. It is of two general kinds, **residual** soil and **transported** soil.

**Residual Soil.** Residual soil is derived from the rocks in place—that is, it has not been carried for any great distance. Sandstone produces sandy soil, limestone a limestone soil and shale and clay rocks a clay soil. By far the greater part of the soil in Oklahoma is residual and partakes of the character of the rocks from which

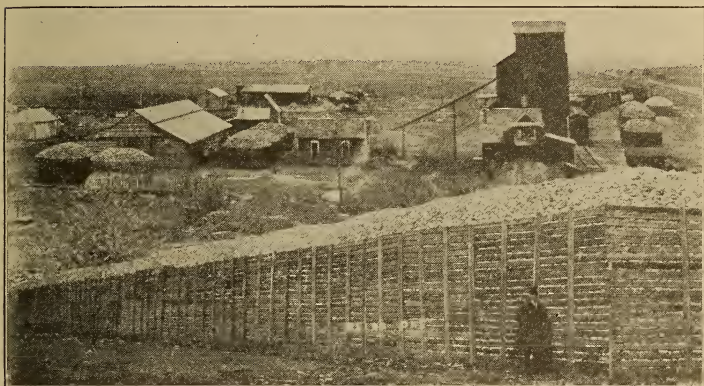


FIG. 63. CORN AWAITING MARKET

it was derived. In the limestone regions, particularly among the Flint Hills and the Ozark and Arbuckle mountains, there is an abundance of rich, black limestone soil. Among the Sand Hills in the central and western counties the soil is often sandy. The Coal Measures rocks in eastern Oklahoma, which consist largely of clay and shale, have produced a stiff clay soil. All over central and western Oklahoma the greater part of the soil is deep red, being derived from the brick-red shales and clays of the

**Redbeds.** On the High Plains the soil is deep and black, and only the lack of sufficient rainfall prevents the raising of a great variety of crops.

**Transported Soil.** Transported soils are those that have been carried for considerable distances. Wind, water and ice are the chief agents that carry soils. In the northern states much of the soil has been brought in by the ice during the glacial epoch. There is, however, no glacial soil in Oklahoma. The soil on the bottom lands along



FIG. 64. TWO VIEWS ILLUSTRATING WHEAT-RAISING

the streams, usually known as alluvium, has been carried downstream by water. On account of the unusually large number of streams which cross the State, Oklahoma contains a larger proportion of rich alluvial soil than almost any other state. Much of the so-called black land on the high divides in central and western Oklahoma and the sandy soil in the sandhills has been carried in by the wind.

In general, alluvial soil and limestone soil are considered the most fertile. The Redbeds soil comes next.

Sandy soil and clay soil are fairly fertile also. Care must be taken to prevent the sandy soil from washing and blowing.

But little fertilizer has been used in Oklahoma. Fields that have been cultivated continuously for twenty years still produce abundantly. Western Oklahoma contains an inexhaustible amount of gypsum, which is a natural fertilizer. The time will come when this material will be used to enrich the worn-out soils of the State.

**Corn.** Corn, wheat, oats and kafir corn are the most important grain crops raised in Oklahoma. Corn has the



FIG. 65. THRASHING WHEAT IN NORTHERN OKLAHOMA

widest range, being produced abundantly in all sections of the State except on the High Plains in the extreme western part. In many of the central and northern counties corn is the great staple crop. On account of the length of the season a corn crop is often raised on land from which a wheat crop has been harvested. Much of the corn is fed to stock on the farm on which it is raised, although many hundreds of thousands of bushels are each year shipped to outside markets. Fig. 63 shows corn piled up alongside a railroad awaiting shipment. In 1906 134,230,590 bushels of corn, valued at \$65,000,000 were raised in Oklahoma.

**Wheat.** Wheat is raised chiefly in northern Oklahoma. In such counties as Kay, Grant, Garfield, Kingfisher, Alfalfa, Woods, Blaine and Canadian it is the leading crop. Various scenes illustrating wheat raising are shown in Figs. 64 and 65. Even in the three western counties which are located on the High Plains, certain varieties of hard wheat are raised at a profit. About one-third of the wheat raised is ground into flour in Oklahoma mills.

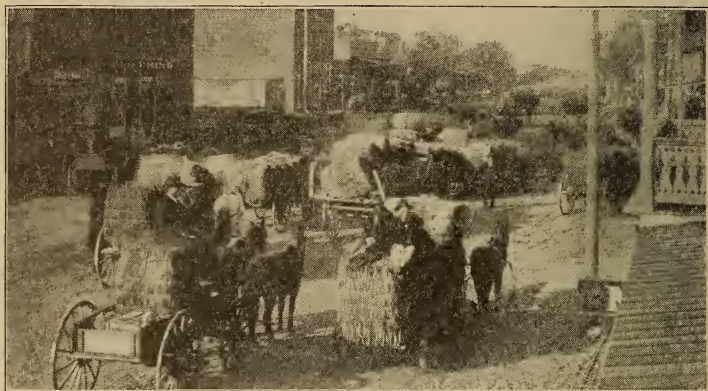


FIG. 66. HAULING BROOM-CORN TO MARKET

Much of the flour and wheat are exported to the eastern states or to Europe. Hundreds of thousands of bushels each year go to Liverpool by way of Galveston. The wheat crop of 1906 was 20,554,000 bushels, valued at \$13,000,000.

**Oats and Other Small Grain.** Oats are raised chiefly in the central and northern part of Oklahoma. Ten million five hundred thousand bushels of oats, valued at \$5,700,000, were raised in Oklahoma in 1906. The greater



part of the crop is fed to live stock in the State, although a large amount is exported. Kafir corn, milo maize, millet, barley and sorghum are raised in many parts of the State, particularly in the western counties. These crops are used both for forage and grain. On the High Plains kafir corn and milo maize produce as many bushels of grain per acre as do the more common grain crops in a



FIG. 67. COTTON GOING TO MARKET

region of greater rainfall. The value of the kafir corn crop is \$2,000,000 a year.

**Broom Corn.** The last few years Oklahoma has produced more broom corn than any other State in the Union. The soil and the climate of the western part of the State are particularly suited to this crop. 44,749 tons, valued \$1,483,000 were produced in 1906. Fig. 66 illustrates marketing broom corn at Woodward.

**Cotton.** Cotton, which is one of the most important crops raised in Oklahoma, is cultivated most extensively



in the southern part of the State, chiefly in the counties south of the Arkansas and Cimarron rivers. Figs. 67, 68 and 69 illustrate various stages in marketing cotton. Oklahoma cotton is noted the world over for the long superior quality of its fiber, and for that reason it is in great demand. Cotton always commands a ready sale, and so can be depended upon as a money-making crop. Nearly all the cotton raised in the State is exported, the greater part of it going by way of Galveston to European ports or to eastern states. During the past few years much cotton has been exported to the Orient, especially to Japan. In 1906 Oklahoma produced 918,000 bales of cotton, valued at \$48,500,000, and the value of the cotton-seed products was \$6,012,000.

**Alfalfa.** Alfalfa, our greatest hay and forage crop, is grown in every county of the State, and each year witnesses a largely increased acreage. From three to five cuttings are produced each year, depending upon the location and length of the season. Alfalfa does best on bottom land or under irrigation, but it is grown on the upland also. The value of the alfalfa crop is more than one million dollars a year. Bermuda grass is also a valuable forage crop.

**Prairie Hay.** During the early settlement of the country prairie grass was cut for hay in all parts of the State. With more extensive farming in the older counties, the greater part of the land once covered with prairie sod has been placed under cultivation, and alfalfa is now grown. In many parts of Oklahoma, however, much prairie hay is still cut, particularly in Craig, Nowata, Rogers, Mayes, Wagoner, Muskogee, Comanche and Tillman counties. The hay is usually baled in the field the

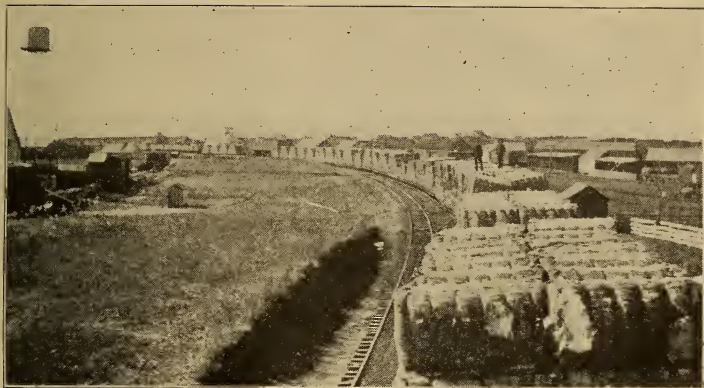


FIG. 68. A TRAIN LOAD OF COTTON



FIG. 69. COTTON BALES ON BOARD CARS.

same day it is cut. It is usually stored in hay barns until it is shipped, the greater part of it going to Kansas City, St. Louis, Memphis and New Orleans markets. The hay crop sells for more than \$3,000,000 a year.

**Fruit.** Fruit raising is destined to become one of the most important industries in Oklahoma. Both soil and climate are particularly adapted to the culture of a very large variety of fruits. A typical fruit farm is shown in Fig. 70. There are more than twenty species of wild fruits growing in Oklahoma, including blackberries, rasp-



FIG. 70. A FRUIT FARM IN CENTRAL OKLAHOMA

berries, strawberries, grapes and several species of plums. The cultivated varieties of apricots, grapes, cherries, pears, plums, quinces and several kinds of berries thrive well. The staple fruits are peaches and apples, both of which grow to larger size and possess a more excellent flavor than those in adjoining states. Extensive orchards are found in many parts of the State, particularly in Cleveland, Oklahoma, Logan, Lincoln and Pottawatomie counties. There is no part of the State except the extreme western counties where the staple fruits do not thrive.

The income from the orchards of Oklahoma is more than \$2,000,000 a year.

**Potatoes.** Potatoes are grown for home use in every county and as a farm crop in a number of localities. Many farmers have made small fortunes raising potatoes. This crop does best in the warm, sandy bottom lands of such streams as the Arkansas and Canadian rivers. More potatoes are shipped from Shawnee and Fort Gibson than from any other points. Two crops are raised each year. The first crop, which is harvested in June, is shipped to northern markets. The second crop is dug in October and is disposed of largely to local dealers. The value of the potato crop is \$1,500,000 annually. Sweet potatoes are extensively grown in many counties, particularly in the fertile sandy upland loam of Canadian and Oklahoma counties. Hundreds of carloads of sweet potatoes are shipped each year to northern and eastern markets.

**Vegetables.** Vegetable gardening and truck farming are carried on quite extensively near several of the larger cities. In a number of localities sweet corn, tomatoes and peas are raised for canning purposes. Onions are extensively cultivated in many localities. The soil and climate of Oklahoma are well adapted to truck farming, and only the absence of a home market prevents the development of a flourishing industry.

**Minor Crops.** There are several crops of minor importance which may be mentioned. Castor beans are an important source of income in some localities in the central and western counties. Watermelons are raised chiefly in the sandhill regions and hundreds of carloads of melons are each year shipped to the northern markets. Cantaloupes are becoming an important crop in many places.

Pecans and other nuts are gathered and shipped from a number of towns in southern Oklahoma. Peanuts are cultivated in many places. Flax is not an important crop, but has been successfully raised in many counties. Tobacco grows well in the eastern part of the State.

**Stock Raising—Cattle.** Oklahoma ranks high in the production of live stock, especially cattle, hogs, horses and mules. For many years Oklahoma and Indian Territory were the stockman's paradise. Nowhere on the con-



FIG. 71. CATTLE ON THE PLAINS

tinent could be found more nutritious grasses and abundant water. These, with the mild climate and timber along the streams, which formed windbreaks, all combined to make cattle raising profitable. Hundreds of thousands of half-wild, long-horned cattle roamed at will over the broad prairies, as shown in Fig. 71. These cattle were marked with the owner's brand. Twice a year the owners and cowboys collected these cattle in "round-



ups'' and separated those belonging to the different owners. When the adjoining states, Kansas and Texas, were settled, the free range became more restricted. As parts of Oklahoma were from time to time opened to settlement the cowman retreated before the advance of civilization. His last stand was in "No Man's Land," the Osage Nation, and the "Big Pasture" in Comanche County. But even these regions are now being allotted or settled and the reign of the cattleman in Oklahoma is at an end.

As the country has been settled and the amount of free range decreased the grade of cattle has been constantly improved. The long-horn has disappeared forever. High-grade dairy and beef cattle are now raised on practically every farm in Oklahoma, and it is altogether probable that the total number of cattle in the State is greater than during the period of free range. In 1907 Oklahoma had 3,200,000 cattle. The value of animals slaughtered for local market was \$9,000,000.

**Horses.** Horses and mules are also raised in all parts of Oklahoma. During the period of free range there was no need for heavy draft animals and the only horses in demand were light-weight, active saddle horses known as "cow ponies." With the coming of the settler, however, the grade of horses has improved until at the present time the farm horses and roadsters bred in Oklahoma compare favorably with those of any of the older states. In 1907 there were 870,000 horses and mules in Oklahoma, valued at \$17,898,000.

**Hogs.** Formerly hogs were raised only in the corn belt, but with the introduction of the growth of alfalfa hogs are being successfully raised in practically all parts of the State. Sheep are raised in certain localities and wool

is becoming an important source of income. Angora goats are raised in several places.

Usually the cattle and hogs raised in Oklahoma are shipped out of the State for slaughter, the greater part going to the stockyards at Fort Worth and Kansas City. Packing plants are located at Oklahoma City and Muskogee. Many of the products, such as salt and canned meats, soap and lard, come back to the State and are used on the farms and ranches where the animals were grown. Local butcher shops are supplied from home-grown cattle and hogs. Many farmers cure their own meat.

**Dairying.** Dairying is rapidly becoming an important industry. The introduction of hand separators has made it possible to put the milk into marketable condition. Cream is separated on the farms and hauled in cans to shipping stations, from whence it is taken regularly to centrally-located creameries. Butter is still made on the farm, however, and milk forms a large part of the food. The cheap forage and grain, pure water and good roads of Oklahoma all combine to make dairying an important industry. The industry is further promoted by instruction in the Agricultural College at Stillwater. The dairy herds are being improved and a number of large dairy farms are scattered throughout the State. The dairy productions of Oklahoma amount to \$2,750,000 a year.

**Poultry.** Poultry raising is carried on in all parts of the state and is constantly increasing. There is an abundance of natural food, and the climate and pure water insure the health of the fowls and their rapid growth at small expense. Chickens are raised on practically all farms, and turkeys, ducks and geese are found

in many communities, particularly in the eastern part of the State. Poultry and eggs form an important part of the food products and are shipped in large quantities to other states. The value of the poultry and eggs produced in Oklahoma each year is \$3,500,000.

**The Farmer's Need.** The great need of the Oklahoma farmer is a home market. With a soil and climate capable of producing a very large number of salable crops, he is compelled to raise only those products that can be shipped outside the State. As soon as the mineral resources of the State are developed, factories and plants will be established, mines and quarries opened, and the army of workmen necessary to operate these industries will create a home market for a great variety of farm products.

### QUESTIONS AND EXERCISES

1. What is the chief occupation of Oklahoma?
2. Why are not the agricultural resources of the State more fully developed?
3. Define soil.
4. What are the two chief kinds of soil?
5. Distinguish between the two kinds.
6. What is the character of the soil near your home?
7. What are the chief grain crops of Oklahoma?
8. Where is corn raised? Wheat? Oats? Kaffir corn?
9. Where is cotton raised? Where is it manufactured?
10. What are the chief hay crops in the State?
11. Name the principal fruits raised in Oklahoma.
12. Where are potatoes grown? Vegetables? Watermelons? Peanuts?
13. Why is Oklahoma a good stock country?
14. What are the chief kinds of live stock raised?
15. Name the chief breeds of cattle. Horses. Hogs.
16. Where is dairying carried on? Poultry raising?
17. What is the principal need of the Oklahoma farmer?

## CHAPTER XIII.

### MINERAL RESOURCES.

**Variety of Minerals in Oklahoma.** Very few states have as many kinds of minerals or as much mineral of a kind as has Oklahoma. The new State has practically inexhaustible quantities of eleven valuable mineral products, as follows: Coal, oil, gas, asphalt, gypsum, salt, lead, zinc, clay of all kinds, stone of all kinds, and sand. In addition to these, Oklahoma has also considerable amounts of iron, some copper and a little gold and silver. There are also known deposits of such substances as tripoli, phosphate, volcanic ash, novaculite and the radium earths, and it is very probable that in time a number of other minerals not now known will be discovered. The map in Fig. 72 shows the locations of the principal minerals in Oklahoma.

Fortunately these mineral products are not confined to any single part of the State. They are widely distributed. There is not a county that does not contain one or more of these products and usually several of them occur in the same locality.

**The Fuels.** The minerals which are always of the greatest importance in the upbuilding of any region are the fuels, coal, oil and gas. For fuel is necessary in the development of manufacturing industries unless water power is present. In many parts of the country the fuel must either be hauled long distances to the raw

material or the raw material hauled to the fuel. For instance, there are large deposits of iron along the shores of Lake Superior, but there is no fuel in the region, so the iron ore is carried to Chicago, Cleveland and Pittsburg to be smelted.

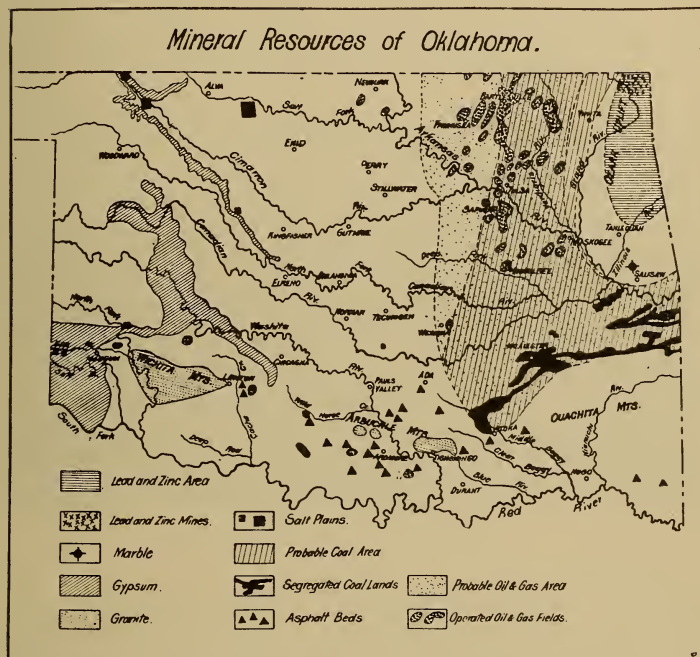


FIG. 72. MAP SHOWING MINERAL PRODUCTS OF OKLAHOMA

Oklahoma's fuel supply is enormous. Coal, oil and gas are all present in large amounts. This means that not only will the raw material in the State be manufactured at home, but also the mineral products from other states will be shipped here to be manufactured.



**Coal.** The total amount of coal in Oklahoma can as yet be only estimated. According to the figures of the United States Geological Survey, there are in the old Choctaw Nation 2,945,138,000 tons of coal, which has been segregated or set apart for the benefit of the Choctaw and Chickasaw Indians. This is probably not more than half the total amount of coal in the State, for there are vast deposits in the former Creek, Cherokee and

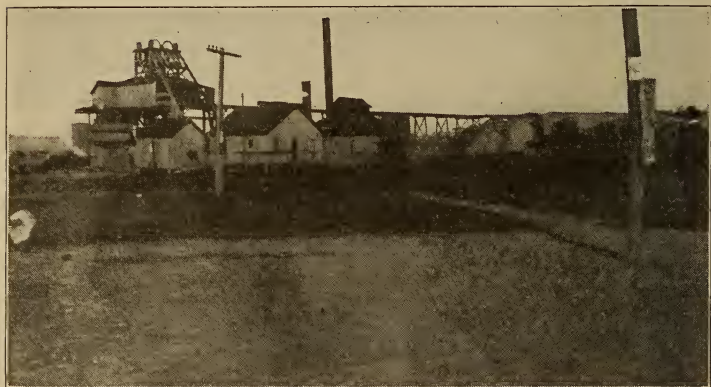


FIG. 73. A COAL MINE AT MIDWAY

Choctaw nations that have not been segregated. The total amount is probably not far from 6,000,000,000 tons. This is more coal than is found in most other states. More than 100 coal mines, large and small, are now being operated, and the amount of coal mined is over 3,000,000 tons a year. A coal mine at Midway is shown in Fig. 73, and one at Lehigh in Fig. 74. The value of the coal mined in 1907 was \$11,440,000. The principal mines are located at or near McAlester, Krebs, Hartshorne, Haileyville, Alder-

son, Coalgate, Lehigh, Edwards, Savanna, Blocker, Henryetta, Schuler, Broken Arrow, Dawson and Collinsville. The coal is chiefly a high-grade bituminous coal. Coke is manufactured near a number of the mines, the fine coal or slack being used for that purpose. The output of the Oklahoma mines supplies a large part of the southern Great Plains with fuel.

**Oil.** Only a small part of the Oklahoma oil and gas

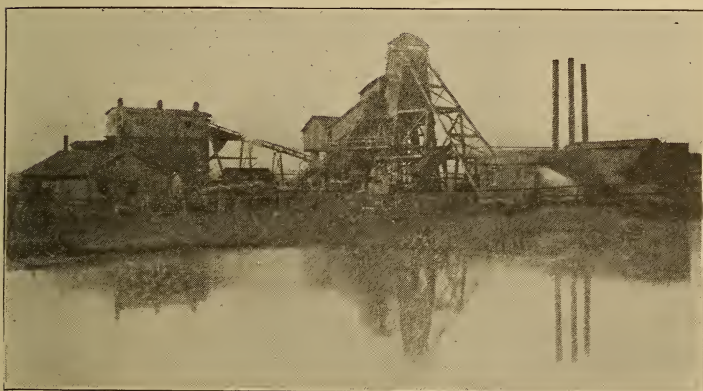


FIG. 74. COAL MINE AT LEHIGH

fields have yet been developed; but, in spite of that, Oklahoma produced nearly 50,000,000 barrels of oil in 1907. By far the greater part of the oil and gas so far found occurs in three general areas. The easternmost of the three areas, known as the Coody's Bluff-Alluwe field, lies along the Verdigris River in the eastern part of Nowata County. The oil is here found at a depth of 500 to 600 feet below the surface and the field is known as the "shallow field." The second line of development

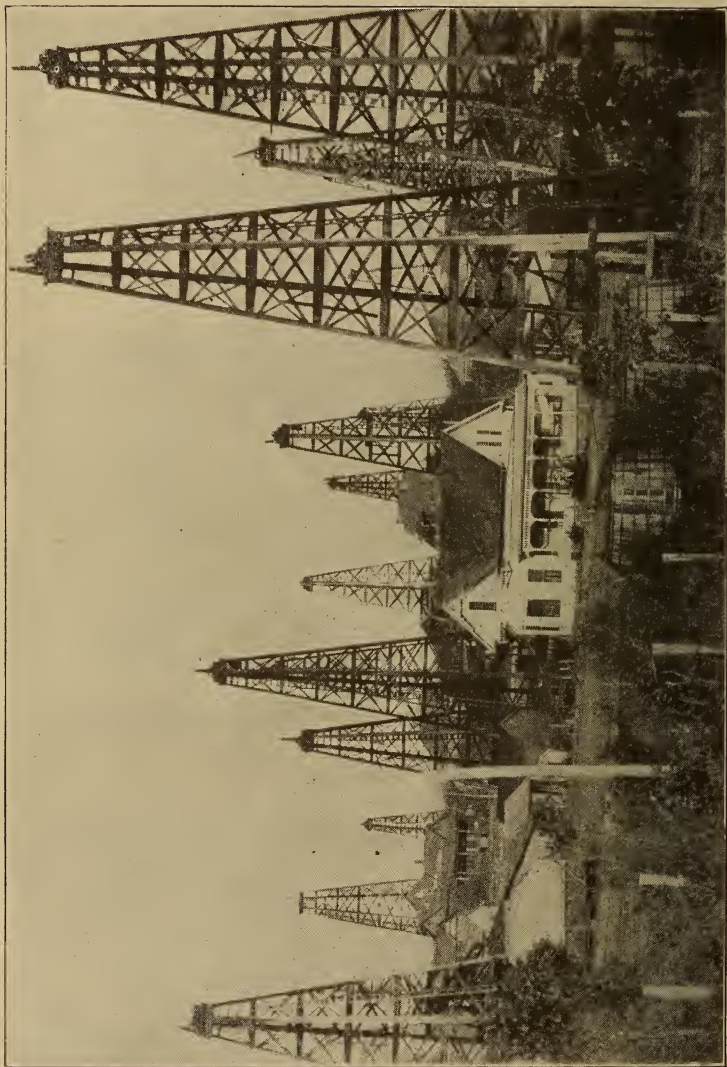


FIG. 75. OIL WELL DERRICKS AT CLEVELAND

is near the 96th meridian in Osage, Washington and Tulsa counties, extending from the Kansas line south for a distance of more than 76 miles. Along this line occur the oil fields of Copan, Dewey, Bartlesville, Ramona, Skiatook, Tulsa and Red Fork. At the southern end of the region lies the famous Glenn Pool, from which 20,000,000 barrels of oil have been produced in less than two years. The third important oil-producing region is at Cleveland, Pawnee County, shown in Fig. 75, where oil comes from a depth of 1,700 feet. There are also a number of scattered fields, some of which show great promise of future development. The most important of these are near Muskogee, Bald Hill and Morris.

Small quantities of oil and gas have also been found at Madill and Wheeler, south of the Arbuckle Mountains, and at Lawton and Gotebo, near the Wichita Mountains. Fig. 76 shows a well from which the oil is flowing.

When the oil comes from the wells it is carried in 2-

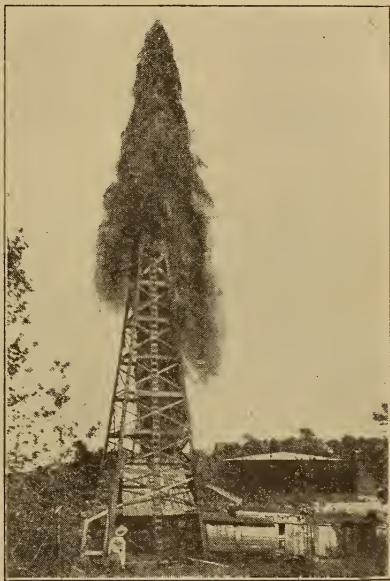


FIG. 76. OIL GUSHING FROM A  
NEW WELL



inch pipes to tanks which hold from 600 to 3,000 barrels each. When these tanks are full the oil is carried again by pipes to larger tanks which hold 35,000 barrels each. There are hundreds of these large tanks in the oil fields. Fig. 77 shows a number of tanks near Copan. From the large tanks the oil is carried away in 6-inch pipes. One pipe line runs from the Oklahoma oil fields north through Kansas and past Chicago to the Atlantic Coast. Two pipe



FIG. 77. A TANK FARM NEAR COPAN

lines run south to the Gulf of Mexico. Much oil is shipped by train, as shown in Fig. 78. Part of the oil is used for fuel in locomotives and factories, but the greater part of it is refined. Our kerosene, gasoline, paraffine and lubricating oil is distilled petroleum.

The Oklahoma oil field has all been developed within the past few years. The difficulty of securing titles to the land in the Indian Territory has hindered development. There is reason to believe that within a few years the area of the oil field will be greatly increased.



**Gas.** The amount of gas in Oklahoma is very great. Hundreds of wells flowing anywhere from 1,000,000 to 10,000,000 cubic feet a day have been shut in, and many wells are reported to flow 40,000,000 to 80,000,000 cubic feet daily. Large areas of known productive territory have not yet been drilled because there is no market for the fuel. Natural gas is now being used in Oklahoma City, Guthrie, Muskogee, Ardmore, Tulsa, Bartlesville,

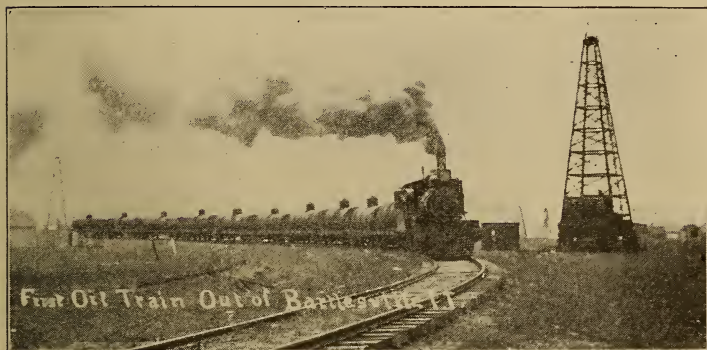


FIG. 78. A TRAINLOAD OF OIL LEAVING BARTLESVILLE

Pawhuska, Coweta, Wagoner, Claremore, Chelsea and a number of other towns in the State. The abundance and cheapness of the gas is attracting manufacturing plants from other states, and before many years the gas and oil region will become the wealthiest part of Oklahoma.

**Asphalt.** The deposits of asphalt in Oklahoma are, so far as known, among the most extensive in the United States. Asphalt is found in many parts of the State, but chiefly in Murray and Carter counties, south of the Arbuckle Mountains. It occurs along fault lines or fis-

tures, which extend from the surface to an unknown depth. The rocks along either side of the fissure for a distance of 10 to 50 feet are permeated with a semi-liquid asphalt. Hundreds of veins have already been found, and new ones are constantly being brought to light, so that no one can say how much asphalt will eventually be discovered. Fig. 79 illustrates an asphalt mill and a



FIG. 79. AN ASPHALT MILL AND MINE NEAR SULPHUR

mine near Sulphur. The asphalt is used chiefly for street paving and roofing. The streets and country roads for a good part of the State will soon be paved with Oklahoma asphalt, and the supply is sufficient for many generations. Fig. 80 shows the streets of Ardmore paved with Ardmore asphalt.

**Salt.** There are in western Oklahoma seven regions of salt springs from which flow salt water so strong that 100 parts of brine will make 33 parts of salt. The springs

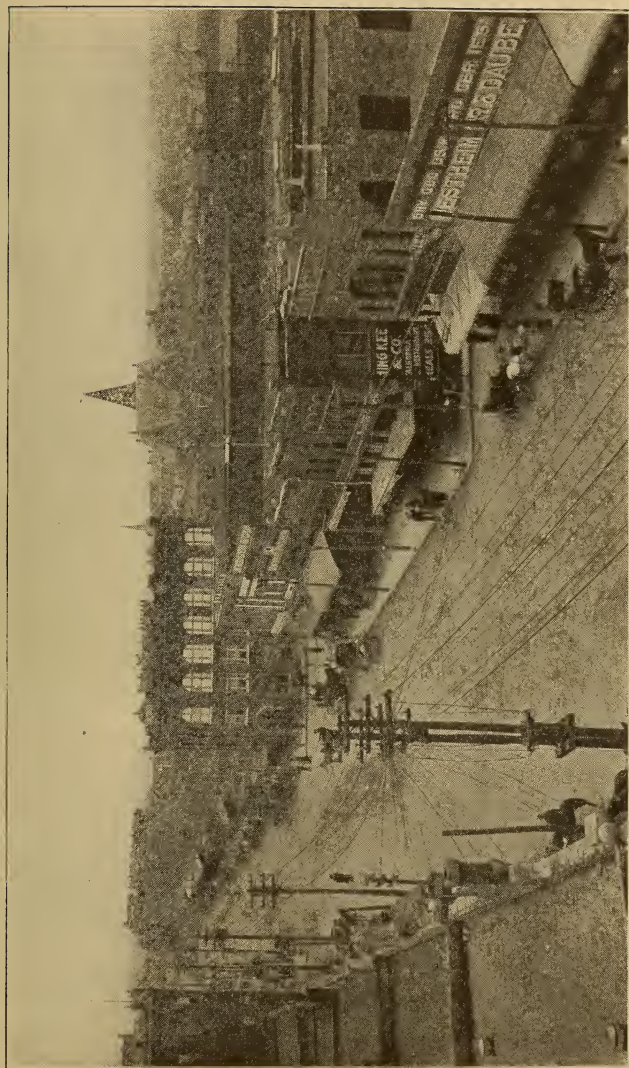


FIG. 80. STREETS OF ARDMORE PAVED WITH OKLAHOMA ASPHALT

which is shown in Fig. 82. These minerals are also reported from the Arbuckle Mountains.

**Building Stone.** Building stone of almost all kinds is found in Oklahoma. Granite of very fine quality occurs in vast quantities in the Wichita and Arbuckle mountains. It is being quarried at Granite and Tishomingo. Gabbro, a fine black ornamental stone, is found in the Wichita Mountains, and is being quarried at Cold Springs. Porphyry occurs in the Wichita and Arbuckle mountains. Limestone suitable for building stone or for burning into lime occurs in a number of counties in eastern and southern Oklahoma. Fig. 83 shows the effect of a blast in a limestone quarry at Crusher, in the Arbuckle Mountains, and Fig. 84 represents limestone posts in Kay County. Marble, which is found in several places, is used in the construction of some of the finest buildings in the State. The Pioneer Telephone building at Oklahoma City (Fig. 85) was built of this marble. Sandstone is present in every county, and near practically every town; it is used locally in the construction of residences and business blocks. The sandstone in the eastern part of the State is gray or brown in color. Some very handsome buildings are built of this stone. In central and western Oklahoma the sandstone is usually red. At the present time comparatively little of the Oklahoma stone is being utilized, and a considerable part of the stone used in the construction of buildings comes from Kansas, Missouri or even from Indiana.

**Clay.** Clay of various kinds is present in many parts of Oklahoma. Throughout the western part of the State there is a large amount of red clay shale, which is utilized for making pressed brick. In many places in eastern





FIG. 83. TWO VIEWS SHOWING EFFECTS OF A BLAST IN A  
LIMESTONE QUARRY AT CRUSHER, OKLA.



Oklahoma there is a clay suitable for the manufacture of drain tile, terra-cotta, stoneware, hollow-ware and other products. Large deposits of fire clay occur in the coal regions, and good kaolin, or fine pottery clay, is reported from the Wichita Mountains. Shale from various regions where limestone is abundant is suitable for the manufacture of Portland cement. The abundance and variety of these clay products, and the immense amounts of coal and gas, render it very probable that within a few

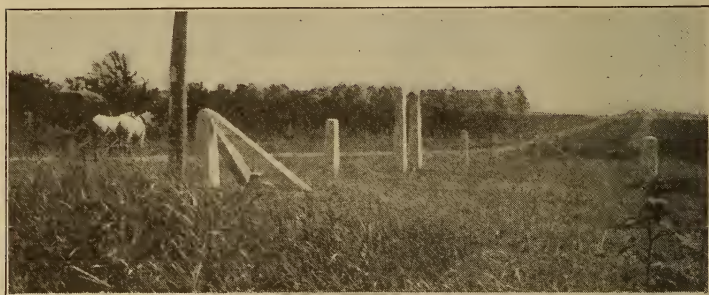


FIG. 84. LIMESTONE POSTS IN KAY COUNTY.

years a large number of clay-products plants will be in operation in Oklahoma.

**Sand.** There is no part of Oklahoma where sand does not occur. Building sand is everywhere sufficient for local demands. In several places, particularly in the Arbuckle Mountains, large deposits of a very fine grade of glass sand have been found. Fig. 86 shows a ledge of glass sand near Bromide. Glass sand differs from other sand in that it is almost pure white, and contains very little iron or other impurities. In some cases this sand is near veins of coal or natural gas. The glass factories

in southern Kansas and northern Oklahoma haul their glass sand from Illinois and Iowa because it is cheaper to transport the sand to the fuel than to bring the fuel to the sand. As soon as the Oklahoma glass sand deposits have been developed another valuable industry will be added to the State.

Iron has been found in small quantities in several places. A high-grade maganese iron ore has been discovered in the Arbuckle Mountains and hundreds of carloads have been shipped to eastern markets. Deposits of hematite and siderite iron ores are reported near McAlester. Copper occurs widely scattered in Oklahoma, but in small amounts. Traces of gold and silver occur in the Wichita and Arbuckle mountains, but there is little reason for believing that either of these minerals will ever be found in large quantities. Novaculite, or razor-hone rock, occurs in the Ouachita Mountains, in the southeastern part of the State.



FIG. 85. PIONEER TELEPHONE BUILDING, OKLAHOMA CITY, BUILT OF OKLAHOMA MARBLE

Tripoli, which is used chiefly for making filters, is found near the Missouri line. Volcanic ash has been found in western Oklahoma. It is used for polishing powder. Deposits of phosphate are reported from several regions.

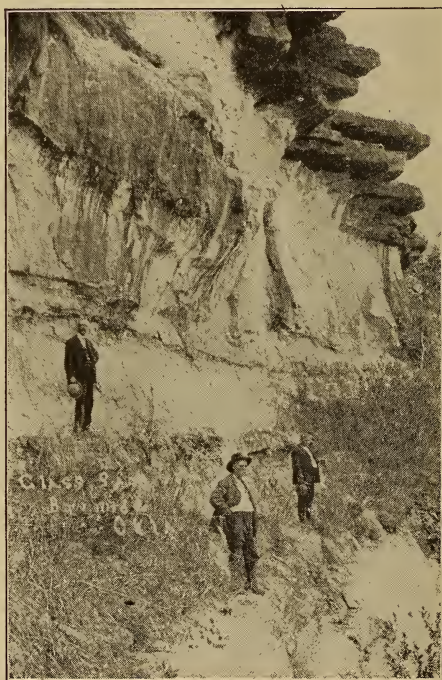


FIG. 86. LEDGE OF GLASS SAND AT BROMIDE

## QUESTIONS AND EXERCISES

1. Name the chief minerals in Oklahoma.
2. How are they distributed?
3. Which are the most important minerals?
4. Discuss Oklahoma's coal deposits.
5. Locate the oil and gas fields.
6. How is the oil produced? How disposed of?
7. Discuss the gas fields.
8. Where is asphalt found? For what is it used?
9. Locate the Salt Springs of Oklahoma.
10. Where are the Gypsum Hills?
11. For what is gypsum used?
12. How much gypsum is there in Oklahoma?
13. Where does the lead and zinc occur?
14. Name the chief kinds of building stone in Oklahoma.
15. Name the chief kinds of clay.
16. Where is glass sand found?
17. Name and locate the minor minerals.

## CHAPTER XIV.

### MANUFACTURES.

Most products, either agricultural or mineral, must be manufactured in order to be useful to man. Wheat must be ground into flour, cotton, wool and flax must be woven into cloth, and cloth made into garments; iron ore must be smelted into iron, and the iron made into tools and machinery; trees must be sawed into lumber, and the lumber used in building houses. All workers in mills, factories and industrial plants, as well as carpenters, masons and bricklayers and the like, are, in a sense, manufacturers.

**Need of Factories.** The manufacturing industries of Oklahoma are yet in their infancy. Few states have either as much raw material or as much fuel for its manufacture; but the people of the State are importing practically all the manufactured articles they use. The State is so young that the people have not yet had time to establish manufacturing plants. The total capital employed in manufacturing in 1906 was \$16,124,417; number of wage earners, 5,456; wages paid, \$2,799,402; value of products, \$24,459,107.

**Clay Products.** Pressed brick is being made at a number of the larger cities, particularly at Oklahoma City, McAlester, Cleveland, Tulsa, Sapulpa, Bartlesville, Muskogee, Enid and Ardmore. Small plants for the manufacture of common brick are located at a number of



towns. Several tile and pottery plants are being located in eastern Oklahoma. There is an abundance of good clay in many parts of the State.

**Portland Cement.** Portland cement plants have been located at Dewey (Fig. 87) and Ada, and others are in contemplation at Nowata, Bartlesville, Tulsa and McAlester. Portland cement is made of limestone and shale. Both are ground fine, mixed, and burned at a high tem-

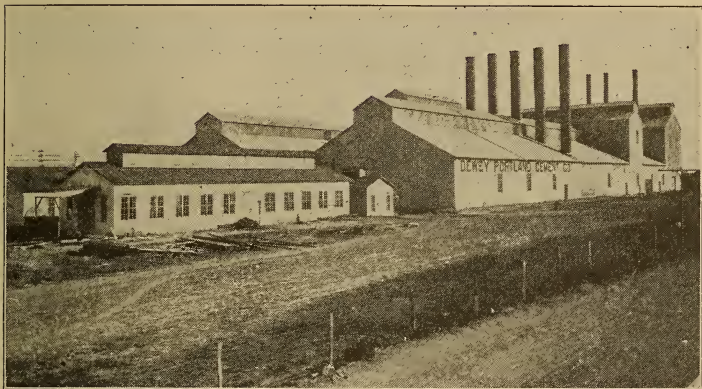


FIG. 87. PORTLAND CEMENT MILL AT DEWEY

perature in large kilns. The substance is again ground fine and then sacked and shipped. There is plenty of lime, clay and fuel for the manufacture of Portland cement in many parts of the State, but few of these resources have been utilized. Portland cement is destined to take the place of wood, stone and iron for the construction of all kinds of buildings. Many people now in middle life will live to see the time when a new wooden house will be a rarity.

**Gypsum Plaster.** Gypsum plaster mills have been erected at or near Okarche, Alva, Watonga, Ferguson, Bickford, Southard, McAlester, Marlow, Eldorado and Cement. During 1907, 384,200 tons of wall plaster worth \$4,610,400 were manufactured. The supply of gypsum in Oklahoma is inexhaustible. (See Fig. 88.) The chief difficulty in the way of profitable manufacture of gypsum plaster in Oklahoma is the fact that fuel must be hauled



FIG. 88. GYPSUM LEDGES IN WESTERN OKLAHOMA

for a considerable distance. Neither coal, oil nor gas is known to occur in any quantity nearer than 150 miles to the gypsum, and the cost of hauling coal so far makes the plaster more expensive than it would otherwise be.

**Flour and Oil Mills.** There are 76 flour mills in Oklahoma having a total daily capacity of 15,000 barrels of flour. Perhaps one-third of the wheat raised is ground into flour in Oklahoma. Cotton oil mills are located at a number of the larger towns. An oil mill built of native

limestone is shown in Fig. 89. In them the oil is extracted from cottonseed and the seed ground into meal which is used for fattening stock.

**Other Manufacturing Plants.** Several glass plants are being erected in the gas region. Iron foundries, machine shops, planing mills, sash and door factories, creameries, canning factories and similar industries are located at the larger cities. Packing plants are located at Okla-

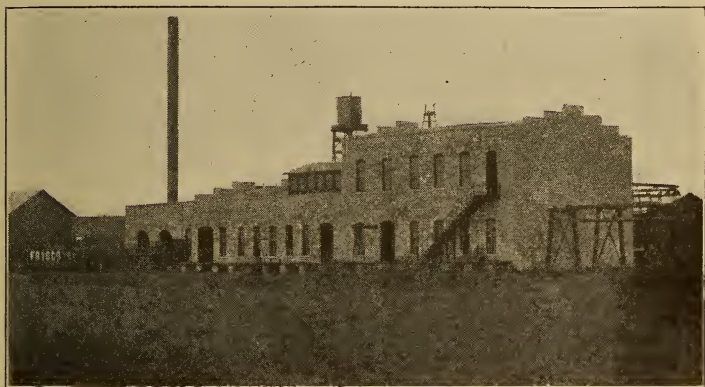


FIG. 89. COTTON OIL MILL AT MADILL

homa City and Muskogee. A cotton mill (Fig. 90) and a cereal mill are located at Guthrie. There are a number of stone crushers in the State where limestone is crushed for railroad ballast and concrete. Oil refineries are located at Muskogee, Oklahoma City and Tulsa in which crude petroleum is refined into gasoline, benzine, kerosene and the lubricating oils. Bartlesville has a zinc smelter, shown in Fig. 91. The ores from Joplin and Miami are shipped here to be smelted.



FIG. 90. INTERIOR OF A COTTON MILL AT GUTHRIE



FIG. 91. ZINC SMELTER AT BARTLESVILLE

**Future of the Manufacturing Industries in Oklahoma.** Oklahoma is destined to become one of the wealthiest states in the Union. Within the past five years the manufacturing industry has increased more than 200%. The great variety and vast amount of the mineral products, and the unsurpassed agricultural resources, taken with the healthful climate, will combine to make Oklahoma a very prosperous state. The thing most needed now is the development of the natural resources.

### QUESTIONS AND EXERCISES

1. What are manufactured articles?
2. Where in Oklahoma is pressed brick manufactured?
3. Where might clay-products plants be established?
4. What is Portland cement?
5. For what is it used?
6. Of what is it made?
7. Where in Oklahoma are Portland cement plants located?
8. Where are gypsum plaster mills located?
9. Where are flour mills located? Cotton oil mills?
10. Name and locate some other manufacturing plants.
11. Why are there so few factories in the State?
12. What manufacturing plants might be established in your county?
13. Why have they not been located?



## CHAPTER XV.

### COMMERCE.

The products of the farm, the factory and the mine must be transported and sold before they are used. Those persons who buy, sell and carry these products are said to be engaged in commerce. This includes all merchants, both wholesale and retail, all railroad employes and sailors, all expressmen and telegraph operators. In olden times goods were carried in caravans on the backs of camels. Even in certain parts of the country today goods are carried by stage or wagon, or even by pack trains.

**Land and Water Transportation.** By far the greater part of the world's commerce is today carried either by rail or on water. Water transportation is carried either in ships on the ocean or in boats on navigable rivers or canals. Water transportation is much cheaper than land transportation and for that reason goods are always shipped by water whenever possible.

**Oklahoma Rivers.** Oklahoma has many rivers, but very few of them are suitable for navigation. The greater part of the streams have sand-choked channels and carry a small amount of water for the greater part of the year. The only streams that may some time be made navigable are the Arkansas below the mouth of the Grand and the Red River in the eastern part of the State. For this reason by far the greater part of the

products shipped into or out of Oklahoma must always be carried by rail.

**Railroads.** Oklahoma has 3,433 miles of railroads. Only four counties are without railroads. Four lines have a larger mileage in the State than all other roads combined. These lines are the Atchison, Topeka and Santa Fe, commonly known as the Santa Fe; the St. Louis and San Francisco, called the Frisco; the Chicago, Rock Island and Pacific, or the Rock Island; and the Missouri, Kansas and Texas, or the Katy. Some one of these roads touches nearly every county seat in Oklahoma and many towns contain two or more of these lines. The Santa Fe and Rock Island roads run directly to Chicago. The Santa Fe touches the Pacific Ocean at Los Angeles, and the Gulf of Mexico at Galveston. The Rock Island touches El Paso and Denver. The Frisco has four main lines of road which cross Oklahoma, touching at Paris, Denison, Vernon and Quanah in Texas. It leads directly through St. Louis to Chicago. The Katy road runs from St. Louis through Oklahoma to Galveston. All these roads have numerous branches which act as feeders to the main line.

The Kansas City Southern road, from Kansas City to the Gulf, crosses eastern Oklahoma. A branch of the Missouri Pacific runs from Fort Smith, Arkansas, crossing the northeastern part of the State to Coffeyville, Kansas. Two other roads run west from Fort Smith. The Midland Valley passes northwest along the Arkansas River to Arkansas City, Kansas, and the Fort Smith and Western goes to Guthrie and El Reno. The Kansas City, Mexico and Orient road crosses western Oklahoma. The Mis-

souri, Oklahoma and Gulf and the Oklahoma Central cross the coal fields.

A study of the map will show that Oklahoma is cob-webbed in every direction with railroads. These roads carry the products of the farm and mine to other parts of the country and bring in the manufactured articles from other regions to Oklahoma. Our cotton and flour go to Galveston, the nearest Gulf port, from which they are shipped by steamer to eastern cities and to Europe. Our cattle and hogs go to the packing plants at Kansas City, Chicago and Ft. Worth. Our corn and hay go to St. Louis, Memphis, New Orleans and eastern markets. Over the same roads are carried lumber from Louisiana and Texas; salt, brick and Portland cement from Kansas; fruits from California; and shoes, clothing and groceries from eastern states. Our modern civilization could not exist in its present form without railroads.

### QUESTIONS AND EXERCISES

1. Who are engaged in commerce?
2. How is the world's commerce carried?
3. Why is transportation on water cheaper than on land?
4. What part of Oklahoma may some day have water transportation?
5. Name the chief railroads in Oklahoma.
6. What counties are crossed by each?
7. What important cities outside of Oklahoma are touched by each?
8. What are the chief railroads in your home county?
9. Over what roads do we export most of the cotton raised in Oklahoma? Corn? Cattle? Wheat?
10. Over what roads do we import most of our oranges? Pressed brick? Shoes? Lumber? Sugar? Wagons?

11. What roads would you take and where would you change cars to go from your home to Oklahoma City? Alva? Stillwater? Norman? Weatherford? Edmond? Tonkawa? Muskogee? Lawton? Miami? Idabel? Sulphur? Medford? Guymon? Bartlesville? Ardmore? Frederick?

## CHAPTER XVI.

### PUBLIC LAND SURVEYS.

**Initial Point.** All the land of Oklahoma has been surveyed by the Federal government according to a system of public land surveys. On a rocky hill a mile south of old Fort Arbuckle, eight miles west of Davis, stands a stone pillar about four feet high and a foot square. On one side are carved the letters I. P. (meaning Indian Principal). On the opposite side is the date, 1870. This is the point from which all the public land in Oklahoma, except Beaver, Texas and Cimarron counties, has been surveyed.

When the United States government decided in 1870 to survey the land in what is now the State of Oklahoma, a party of surveyors was sent to Fort Arbuckle, which was then the army post nearest the center of the area to be surveyed. These men went a mile south of the fort and selected a point at which to begin. This is called the Initial Point. On this point they set up the sandstone pillar.

**Principal Meridian and Range Lines.** From the Initial Point the surveyors ran a true north and south line extending north to Kansas and south to Texas. This line is called the Indian Principal Meridian. They then went six miles east of the principal meridian and surveyed another north and south line parallel with it. This is known as a range line and all land between the principal meridian



and this line is said to be in Range 1 East. Six miles farther east is a second range line and the land between the first and second range lines is in Range 2 East. In like manner, running north and south, range lines were laid out every six miles apart all the way to the Arkansas line. Other range lines were surveyed west of the principal meridian and the land lying between these lines is known as Range 1 West, Range 2 West, etc.

**Base Line and Township Lines.** Going back to the Initial Point a line was surveyed east and west from Arkansas to the western part of the territory. This is known as the Base Line. At intervals of six miles apart north and south of the base line, other lines were surveyed, known as township lines. The strip of land six miles wide running east and west between two township lines is known as a township. Thus the six mile strip north of the base line and between it and the first township line is known as Township 1 North. The strip between the second and third township line south of the base line is Township 2 South, etc.

**Congressional Townships\*:** By this method all the territory was cut up into blocks six miles square, known

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\*It is unfortunate that the word township is used in three senses in the United States:

First. A township is a strip of land running east and west six miles wide, parallel to a base line.

Second. A congressional township is a tract of land six miles square containing thirty-six sections, bounded by range lines and township lines.

Third. A municipal or political township is a subdivision of a county which has its own local government and elects its own officers. It may contain only a part of a congressional township or it may include several congressional townships.

as congressional townships. There are in Oklahoma about two thousand congressional townships.

Each congressional township contains 36 square miles known as sections, each containing 640 acres. These sections are numbered consecutively from 1 to 36, beginning on the northeast corner as shown in Fig. 92.

**Sections.** Each section is usually divided into quarter sections containing 160 acres. The quarter section is the unit of subdivision in granting land to settlers. No person

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

FIG. 92. DIAGRAM OF A TOWNSHIP SHOWING LOCATION OF SECTIONS.

can homestead more than 160 acres; so that many farms, particularly in the western part of the state, are of this size.

The section, however, may be divided into tracts of any size as shown in Fig. 93, which represents a section divided into tracts of 320, 160, 80, 40, 20, and 10 acres. The description of tract numbered B would read the Southwest quarter of section thirty-four, Township four North, Range seven East, usually abbreviated to S. W.  $\frac{1}{4}$  Sec. 34, T. 4 N., R. 7 E., containing one hundred and sixty

acres. The description of tract numbered F would be the southeast quarter of the southeast quarter of the southeast quarter of section thirty-four, Township four north, Range seven East, usually abbreviated to S. E.  $\frac{1}{4}$ , S. E.  $\frac{1}{4}$ , S. E.  $\frac{1}{4}$ , Sec. 34, T. 4 N., R. 7 E., containing ten acres.

**Corner Stones.** A stone has been placed in the ground at each section corner, and usually one at the corner of each quarter section. These stones have been marked so

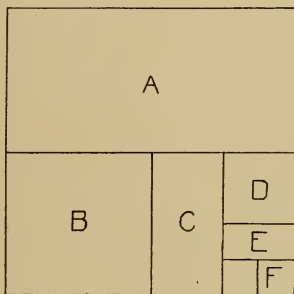


FIG. 93. DIAGRAM SHOWING HOW A SECTION MAY BE DIVIDED.

that by reading the marks one can locate the section. It is easy to learn to read the marks on a corner stone if the following rules are observed:

Along a range line, that is, on the east or west side of a township, the marks are on the **north** and **south** sides of the stone. There will be as many marks on the north side of the stone, for instance, as the number of miles to the next township corner. On the southeast corner of section 12, there will be two marks on the north side of the stone and four marks on the south side. On the

northeast corner of section 36 there will be five marks on the north and one on the south.

Along township lines, the marks are on the **east** and **west** sides of the stone and there are as many marks as the number of miles to the next township corner. The northeast corner of section 2 will have one mark on the east and five on the west.

Except along township and range lines the marks are on the **east** and **south** sides of the stone, and there are as many marks as the number of miles to the east or south line of the township. For instance, the stone at the corner of sections 10, 11, 14 and 15 will have two marks on the east and four on the south because this stone is two miles from the east line of the township and four miles from the south line. In the center of the township at the corner of sections 15, 16, 21 and 22 there will be three marks on the east and three on the south.

In the eastern part of the state, that is in old Indian Territory, there is at each township corner an iron pillar, standing about three feet above the ground, with a brass cap, on which is given the number of the township and range as well as the elevation above the sea level. In the timbered country section lines may be followed by blazes on the trees, and at each section corner the number of the land is cut on four trees, one in each section, known as witness trees, or bearing trees.

In the prairie country there are of course no blazes nor witness trees. The corner stones are marked however. In the older settled parts of the state where roads have been opened upon section lines, the marks on the corner stones have usually been rubbed off by passing

wheels, and in many cases the corner stones themselves have been broken down.

**Cimarron Meridian.** The land in Cimarron, Texas and Beaver counties, which occupy what was formerly known as No Man's Land or the Neutral Strip, was not surveyed from the same principal meridian or base line as the remainder of the State. This area, which is about 135 miles long east and west and 35 miles wide, was surveyed from the Cimarron Meridian, which is the extreme western line of the State. The Base Line is the southern line of the area, which is also the northern line of the Texas Panhandle.

#### QUESTIONS AND EXERCISES

1. Where is the initial point for Oklahoma?
2. What is a principal meridian?
3. Through what counties does the Indian principal meridian pass?
4. In what range is Muskogee? Hobart? Newkirk? Durant?
5. Near what towns does the Oklahoma base line pass?
6. What is a township? A congressional township? A municipal township?
7. How are sections numbered?
8. How are sections divided?
9. Write the descriptions of an eighty-acre tract; a ten-acre tract.
10. How are corner stones numbered?
11. What marks are on the corner stone at the southwest corner of section 8; northeast corner of section 13; at the center of the township; at the northeast corner of section 12; at the northwest corner of section 27?



12. What are bearing trees?
13. Where is the Cimarron meridian?
14. Write the description of some farm in Oklahoma.
15. Write the description of the forty-acre tract upon which your school house is located.

## CHAPTER XVI.

### POPULATION, CITIES AND COUNTIES.

**Population and Emigration.** The population of Oklahoma in 1907 was 1,414,177. Of these 75,012 were Indians. Only about one-fourth of the inhabitants of Oklahoma were born within the State. The immigration from adjoining states has been large, Texas being accredited with 153,000; Missouri with 128,000, and Kansas with 111,000. Every state and territory in the Union is represented in Oklahoma. In the western part of the State there are a few colonies of Germans and Russians, but by far the greater part of the inhabitants are American-born.

By far the greater part of the people in Oklahoma live in the country. The government census showed that only about 250,000 persons, or one in six, lived in towns of over 1,000 population.

**Growth of Cities.** A city may be located by accident, but no city ever became great by accident. Cities naturally grow up where there are particular advantages in the way of manufacturing, mining, or commerce. New York, Galveston, Chicago, Seattle and New Orleans are examples of cities that owe their importance largely to commerce. Lowell, Rochester and Niagara Falls are manufacturing centres because they are located near extensive water power. Butte, Joplin, Scranton and Birmingham

are mining centres. Pittsburg and St. Louis are examples of cities which have favorable location for both manufacturing and commerce. Pittsburg is located at the head of navigation on the Ohio river near the vast coal and gas deposits. St. Louis is near coal fields also and near the point where the Missouri and Ohio enter the Mississippi. Occasionally a city becomes large which seems to have no particular reason for doing so. Examples are Denver, Indianapolis and Dallas. These towns sometimes owe their prominence to the number of railroads, or to being natural distributing centres, but more often to the energy of "town builders."

**Oklahoma Cities.** Nowhere in the world have towns grown faster than in Oklahoma. Twenty years ago the State was a raw prairie; today it is dotted with hundreds of towns. The largest towns are those that have had some advantage of railroad or rich farming communities. Most of the larger towns in the Territory of Oklahoma were the original county-seat towns. A few large ones, such as Ponca, Blackwell, Weatherford and Geary, are not county seats. On the Indian Territory side of the State such towns as McAlester, Wilburton, Coalgate, Lehigh, Tulsa and Bartlesville owe their importance largely to the location of mineral. Durant, Ardmore, Vinita and Chickasha are in fine farming communities. Muskogee, the largest town in eastern Oklahoma, owes its importance partly to its location near the head of navigation on the Arkansas and partly to the fact that the headquarters of the Dawes Commission was located there.

The report of the Government census taken in September, 1907, showed that Oklahoma had at that time 95

cities with a population exceeding 1,000, of which 44 have more than 2,000 and 5 more than 10,000 population. The more important cities of the State will be discussed in the order of their population.

**Oklahoma City**, the largest city in Oklahoma, is located within twenty miles of the geographical center of the State. It is a railroad center and carries on a large wholesale trade, having 185 manufacturing and jobbing



FIG. 94. A MODERN OFFICE BUILDING AT OKLAHOMA CITY

houses and ten banks. There are 40 miles of asphalt streets, 73 miles of sewers and 120 miles of brick and cement sidewalk. It is a prominent cotton and grain market, approximately 100,000 bales of cotton and 1,200,000 barrels of flour being handled annually. Epworth University, a denominational school, and several private business and academic schools, are located here. Fig. 94 shows an office building and Fig. 95 the Court House in Oklahoma City.

**Muskogee**, the second city of importance in Oklahoma, is located near the mouth of the Verdigris and Grand rivers and at the head of navigation of the Arkansas River. Muskogee has four competing lines of railroad, a number of wholesale houses and factories and is located near rich oil, gas, coal and mineral deposits, and not far from cheap water power. Three denominational colleges, Bacone, Spaulding and Nazareth, are located here.

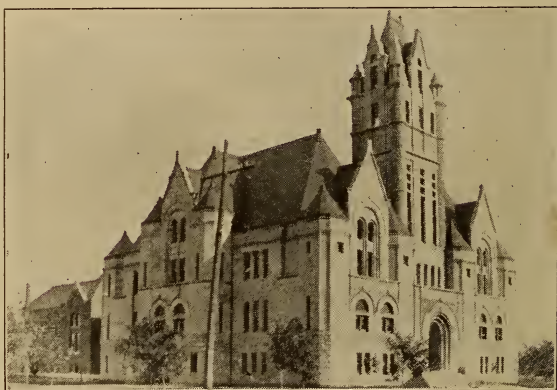


FIG. 95. COURT HOUSE AT OKLAHOMA CITY

Muskogee is the seat of the Indian agency and was for years the headquarters of the Dawes Commission.

**Guthrie**, the present capital of the State, is the county seat of Logan County. It has 50 factories and wholesale houses, six competing lines of railway and a large retail trade.

**Shawnee** is located in a rich farming country in the valley of the North Canadian River; cotton and potatoes being the chief crops shipped. The city contains 37 fac-



tories and 15 jobbing houses. The Rock Island shops are located here.

**Enid**, the largest city in the northwestern part of the State, owes its prominence to the number of railroads which converge here and to the wholesale and retail trade. It is the center of the wheat producing section of the State. A denominational school, the Oklahoma Christian University, is located at Enid.

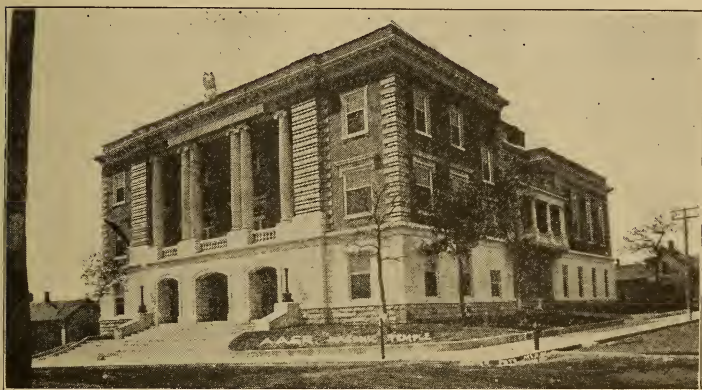


FIG. 96. MASONIC TEMPLE AT MCALESTER

**Ardmore**, the largest city in southern Oklahoma, has a large cotton trade and is located near rich asphalt, oil and mineral deposits. There are several factories and wholesale houses. It has three competing lines of railroad. See Fig. 80.

**McAlester**, the largest city in the southeastern part of the State, owes its prominence to the vast deposits of coal and other minerals located near at hand. The town has a number of wholesale houses and manufacturing estab-

lishments and is the chief coal shipping point of the State. A street railroad connects McAlester with a number of suburban towns. Fig. 96 is the Masonic Temple at McAlester, and Fig. 97 a hotel in the same city.

**Chickasha**, the county seat of Grady County, which is one of the richest counties in the State, is a distributing point for southwest Oklahoma. It has three competing lines of railroads and a number of jobbing houses.



FIG. 97. BUSBY HOTEL AT MCALESTER

**Tulsa** is situated on the Arkansas river near the center of the oil and gas region of Oklahoma. A burning oil tank near Tulsa is shown in Fig. 98. Coal, clay and limestone are found near at hand. The city has several lines of railroad and a number of manufacturing plants. A denominational college, Henry Kendall, is located at Tulsa.

**Lawton**, the county seat of Comanche County, is lo-

cated near Fort Sill, at the eastern end of the Wichita Mountains. It has a large cotton and grain trade.

**El Reno**, the county seat of Canadian County, is at the junction of two important lines of railroad. It is the center of a rich farming country and has a large cotton and grain trade.

**Durant**, in Bryan County, the second largest city in



FIG. 98. SMOKE FROM BURNING OIL

southern Oklahoma, has a denominational school and a State Normal school. It has a large cotton trade.

**Sapulpa**, in Creek County, is an important railroad center, situated near the center of the oil and gas fields of the State. Fig. 99 is a bird's-eye view of Sapulpa, with smoke from burning oil in the distance.

**Bartlesville** is the county seat of Washington County, which is one of the wealthiest counties in the State. One of the largest known gas fields in the world is located

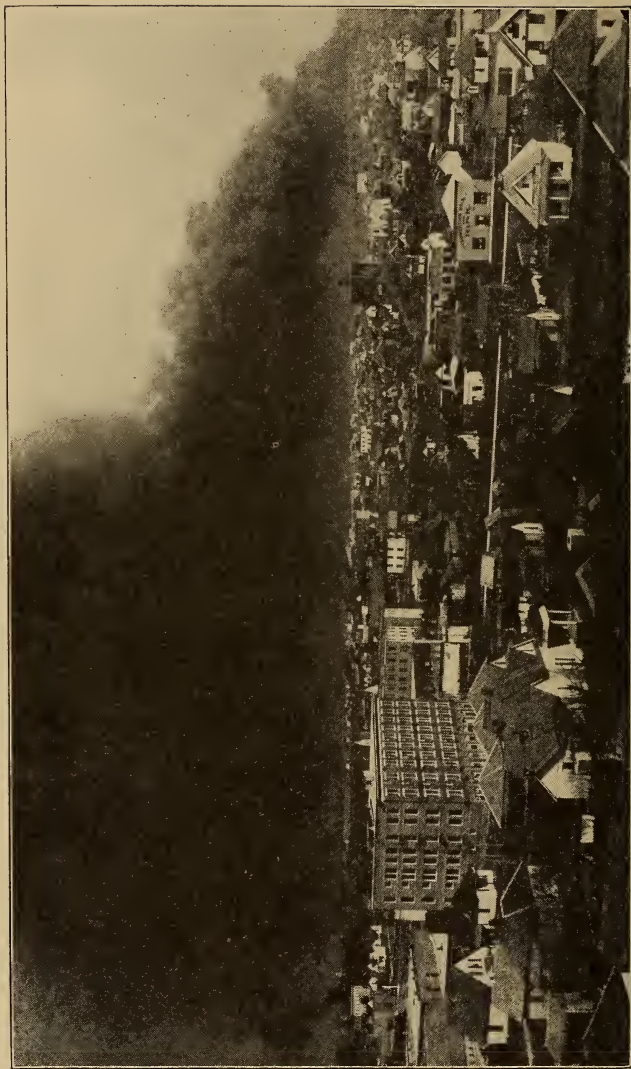


FIG. 99. BIRD'S-EYE VIEW OF SAPULPA SHOWING BURNING OIL IN THE DISTANCE

near the city. The city has zinc smelters, glass and brick plants and a Portland cement plant is located near by.

**Ada**, in Pontotoc County, in the center of a rich farming country, contains a State Normal school. A Portland cement mill is located here.

**Vinita**, the largest city in northeastern Oklahoma, is the county seat of Craig County. It is near the oil and gas fields and is the center of a rich farming country.

**Norman**, in Cleveland County is the seat of the State University, the head of the State school system. It has a good grain and cotton market.

**Stillwater**, in Payne County, is the seat of the Agricultural College.

**Alva**, the county seat of Woods County; **Edmond**, in northern Oklahoma County, and **Weatherford**, in Custer County, contain State normal schools.

Brief mention may be made of the following cities which fall below 3,000 in population:

**Sulphur**, in Murray County, is located near Platt National Park, where are a number of medicinal springs.

**Coalgate** and **Lehigh**, in Coal County, are in the center of one of the most productive coal regions in the State.

**Perry**, in Noble County, is the center of a good wheat and corn country.

**Newkirk**, **Blackwell** and **Ponca City** are large towns in Kay County, which is one of the richest counties of the State.

**Hobart**, in Kiowa County, and **Mangum**, in Greer County, are noted cotton markets.

**Hartshorne**, **Haileyville**, **Wilburton** and **Poteau** are coal towns in eastern Oklahoma.



Wagoner, Okmulgee, Claremore, Miami and Nowata are county seats in eastern Oklahoma.

Tahlequah is the county seat of Cherokee County, the capital of the former Cherokee Nation. It has fine springs of soft water. A Normal school is located here.

Tishomingo, Purcell, Duncan, Hugo, Pauls Valley and Marietta are county seats in southern Oklahoma.

Pawhuska was the capital of the Osage Nation; Wewoka of the old Seminoles, and Okmulgee of the former Creek Nation.

Chandler, Kingfisher, Elk City, Anadarko, Frederick, Wynnewood and Woodward are cities of over 2,000 population.

**Counties.** The State is divided into 75 counties. The smallest county is Washington with 440 square miles; the largest is Osage with 2,297 square miles. The most populous county is Oklahoma with 55,849 people; the least populous is Cimarron with 5,293.

The following table includes the names of the counties, with the area and population of each, as well as the name and population of the county seat, according to the Federal census taken in 1907. The figures are those of the census taken the same year:

NAME	AREA sq. mi.	POP.	COUNTY SEAT	POP.
Adair .....	612	9,115	Westville.....	941
Alfalfa .....	888	16,070	Cherokee .....	964
Atoka .....	990	12,013	Atoka .....	1,700
Beaver .....	1,890	13,364	Beaver .....	271
Beckham ....	1,044	17,379	Sayre .....	1,179
Blaine .....	1,008	17,277	Watonga .....	1,608
Bryan .....	900	27,865	Durant .....	4,516

NAME	AREA sq. mi.	POP.	COUNTY SEAT	POP.
Caddo .....	1,386	30,241	Anadarko .....	2,190
Canadian ....	900	20,110	El Reno .....	5,370
Carter .....	800	36,402	Ardmore .....	8,749
Cherokee ....	792	14,274	Tahlequah .....	1,916
Choctaw ....	825	17,340	Hugo .....	2,676
Cimarron ....	1,450	4,293	Kenton .....	225
Coal .....	522	15,585	Lehigh ....	2,188
Cleveland ....	576	18,460	Norman .....	3,040
Comanche ...	1,723	31,938	Lawton .....	5,562
Craig .....	775	14,955	Vinita .....	3,157
Creek .....	972	18,365	Sapulpa .....	4,294
Custer .....	1,008	19,478	Arapaho .....	610
Delaware ....	770	9,876	Grove .....	694
Dewey .....	1,029	13,329	Taloga .....	430
Ellis .....	1,041	13,978	Grand .....	200
Garfield .....	1,080	28,300	Enid .....	10,087
Garvin .....	846	22,787	Pauls Valley .....	2,157
Grady .....	936	23,420	Chickasha .....	7,896
Grant .....	1,008	17,638	Pond Creek .....	2,200
Greer .....	1,116	23,624	Mangum .....	2,672
Harper .....	980	8,089	Buffalo .....	500
Haskell .....	612	16,856	Stigler .....	1,001
Hughes .....	792	19,945	Holdenville .....	1,868
Jackson .....	720	13,439	Altus .....	1,927
Jefferson ....	780	13,439	Ryan .....	1,115
Johnston ....	666	18,672	Tishomingo .....	1,300
Kay .....	927	22,165	Newkirk .....	1,788
Kingfisher ...	900	9,349	Kingfisher .....	2,300
Kiowa .....	1,486	24,678	Hobart .....	3,136
Latimer .....	756	37,294	Wilburton .....	1,451
Leflore .....	1,731	30,707	Poteau .....	1,726

NAME	AREA sq. mi.	POP.	COUNTY SEAT	POP.
Lincoln .....	967	11,134	Chandler .....	2,234
Logan .....	737	14,307	Guthrie .....	11,648
Love .....	500	13,081	Marietta .....	1,391
Major .....	1,144	11,065	Fairview .....	887
Marshall ....	450	12,888	Madill .....	1,587
Mayes .....	684	10,359	Pryor Creek .....	1,103
McClain ....	600	17,975	Purcell .....	2,552
McCurtain ...	1,942	11,948	Idabell .....	600
McIntosh ....	666	17,975	Eufaula .....	950
Murray .....	450	11,948	Sulphur .....	2,936
Muskogee ....	828	38,341	Muskogee .....	14,418
Nowata .....	576	10,453	Nowata .....	223
Noble .....	675	11,198	Perry .....	2,881
Okfuskee ....	648	15,595	Okemah .....	1,027
Okmulgee ....	684	14,362	Okmulgee .....	2,322
Oklahoma ...	720	55,849	Oklahoma City ....	32,431
Osage .....	2,297	15,332	Pawhuska .....	2,407
Ottawa .....	504	12,827	Miami .....	400
Pawnee .....	720	17,112	Pawnee .....	1,943
Payne .....	720	22,022	Stillwater .....	2,577
Pittsburg ....	1,368	37,677	McAlester .....	8,142
Pontotoc ....	684	23,057	Ada .....	3,257
Pottawatomie..	864	43,272	Tecumseh .....	1,621
Pushmataha .	1,422	8,295	Antlers .....	854
Roger Mills ..	1,122	12,230	Cheyenne .....	600
Rogers .....	638	15,485	Claremore .....	2,064
Seminole ....	605	14,687	Wewoka .....	794
Sequoyah ....	638	22,450	Sallisaw .....	1,689
Stephens ....	810	20,148	Duncan .....	2,451
Texas .....	1,962	16,428	Guymon .....	839
Tillman .....	720	12,869	Frederick .....	2,036

NAME	AREA sq. mi.	POP.	COUNTY SEAT	POP.
Tulsa .....	900	21,693	Tulsa .....	7,588
Wagoner ....	576	19,529	Wagoner .....	2,950
Washington ..	440	12,813	Bartlesville .....	4,215
Washita .....	1,008	22,006	Cordell .....	1,393
Woods .....	1,200	15,517	Alva .....	2,800
Woodward ...	1,224	14,595	Woodward .....	2018

## QUESTIONS AND EXERCISES

1. What is the population of Oklahoma?
2. How do cities become great?
3. Account for the growth of Oklahoma City.
4. Name the ten largest cities in Oklahoma.
5. Name and locate the counties of Oklahoma.
6. Name the county seat of each county.

## PRONOUNCING VOCABULARY

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Ammonite, am'-mo-nite  
Anadarko, an-a-dar'-ko  
Arapaho, a-rap'-a-ho  
Arbuckle, ar'-buck-le  
Arkansas, ar'-kan-saw,  
    or ar-kan'-sas  
Atoka, a-to'-ka  
Bokoshe, bo-ko'-she  
Brachiopod, brak'-e-o-pod  
Cache, kash  
Cambrian, kam'-bre-an  
Canadian, ka-na'-di-an  
Carboniferous, kar-bon-if'-  
    er-ous  
Catoosa, ka-too'-sa  
Checotah, she-co'-ta  
Chelsea, chel'-se-a  
Cherokee, cher'-o-kee  
Cheyenne, shi-en'  
Chickasaw, chick'-a-saw  
Chickasha, chick'-a-shay  
Choctaw, chock'-taw  
Cimarron, sim-ar-rone'  
Concharty, kon-char'-ty  
Cretaceous, kre-ta'-shus  
Crinoid, kri'-noid  
Devonian, de-vo'-ni-an

Eufaula, u-fau'-la  
Illinois, il-li-noi'  
Jurassic, ju-ras'-sic  
Kiamitia, ki-a-me'-sha  
Kickapoo, kick'-a-poo  
Kiowa, ki'-o-wa  
Muskogee, mus-ko'-gee  
Neosho, ne-o'-sho  
Nowata, no-wa'-ta  
Okemah, o-ke'-ma  
Okfuskee, ok-fus'-kee  
Okmulgee, ok-mul'-gee  
Oklahoma, ok-la-ho'-ma  
Ordovician, or-do-ve'-shan  
Osage, o'-saj  
Ottawa, ot'-ta-wa  
Oteo, o'-toe  
Ouachita, wa'-she-taw  
Ozark, o'-zark  
Pawhuska, paw-hus'-ka  
Permian, per'-mi-an  
Peoria, pe-o'-ri-a  
Ponca, pon'-ka  
Pontotoc, pon'-to-tok  
Poteau, po'-toe  
Pottawatomie, pot-ta-wat'-  
    to-mie



Pushmataha, push-ma-ta'-ha	Tecumseh, te-kum'-se
Quapaw, qua'-paw	Tertiary, ter'-shi-a-ry
Quaternary, qua-ter'-na-ry	Tishomingo, tish-o-min'-go
Sallisaw, sal'-li-saw	Tonkawa, tong'-ka-wa
Sansbois, san'-boy	Triassic, tri-as'-sic
Sapulpa, sa-pul'-pa	Trilobite, tri'-lo-bite
Seminole, sem'-i-nole	Tulsa, tul'-sa
Seneca, sen'-e-ka	Verdigris, ver'-de-gree
Sequoyah, se-quoy'-ah	Vinita, ve-ne'-ta
Silurian, si-lu'-ri-an	Washita, wa'-she-taw
Spavinaw, spav'-i-naw	Watonga, wa-tung'-ga
Tahlequah, tah'-le-quah	Wewoka, we-wo'-ka
Taloga, ta-lo'-ga	Wichita, wich'-e-taw

# I N D E X

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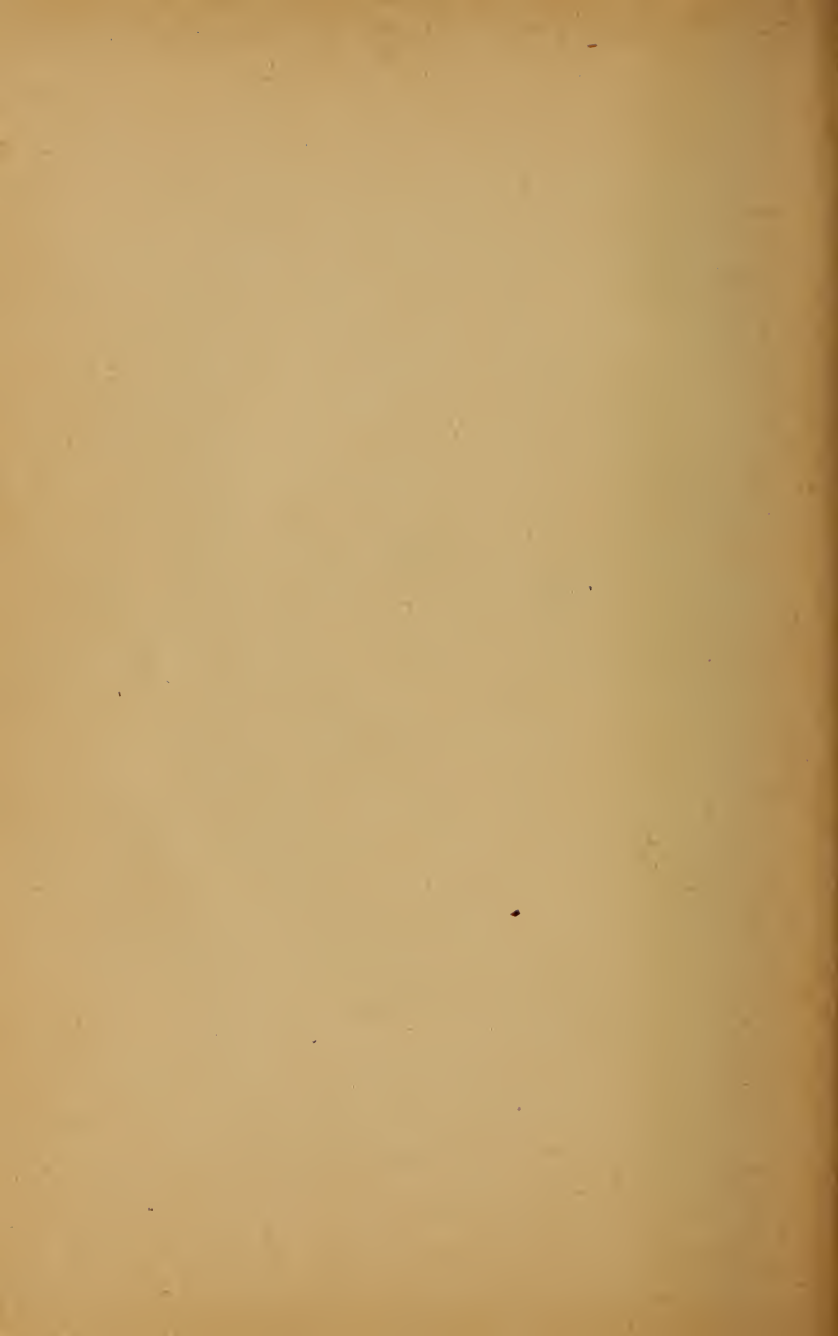
	Page		Page
Ada .....	169	County Schools .....	103
Admission of Oklahoma..	98	Counties .....	170
Air .....	63	Cretaceous Rocks .....	39
Alfalfa .....	118	Crops, minor .....	121
Alva .....	169	Cyclones .....	67
Arbuckle Mountains ....	10		
Ardmore .....	165	Dairying .....	124
Arkansas River .....	51	Dawes Commission .....	97
Arkansas Valley Region...	15	Disposal of Rainfall.....	43
Artesian Wells .....	48	Drainage .....	50
Asphalt .....	133	Drainage Basins .....	51
		Durant .....	167
Bartlesville .....	167		
Birds .....	80	Edmond .....	169
Boundaries of Oklahoma..	2	Education .....	102
Broom Corn .....	117	El Reno .....	167
Building Stone .....	138	Enid .....	165
		Emigration .....	161
Carboniferous Rocks ....	35	Executive Department ...	109
Cattle .....	122		
Character of Settlers....	98	Factories .....	144
Cherokee Strip .....	94	Fauna .....	74-78
Chickasha .....	166	Fishes .....	82
Church Schools .....	106	Five Civilized Tribes....	83
Cimarron River .....	57	Five Civilized Tribes,	
City Schools .....	104	migration of .....	84
Cities, growth of .....	161	Five Civilized Tribes,	
Clay .....	138	disposal of land .....	84
Clay Products .....	144	Flora .....	74-75
Climate .....	68-72	Flour and Oil Mills ....	146
Coal .....	128	Fruits .....	120
Constitution .....	108	Fuels .....	126
Corn .....	115		
Corn, broom .....	117	Gas .....	133
Cotton .....	117	Geology .....	25

	Page		Page
Geologic Periods .....	26	Minor Crops .....	121
Government .....	108	Mississippian Rocks .....	36
Government, executive department .....	109	Mistletoe .....	77
Government, judicial de- partment .....	110	Mode of Life Among Indians .....	89
Government, legislative department .....	108	Muskogee .....	164
Government, local .....	110	No Man's Land .....	93
Government Maps .....	3	Norman .....	169
Grand River .....	54	North Canadian River....	55
Grasses .....	77	Oats and Other Grains..	116
Great Plains .....	5	Oil .....	126
Greer County .....	95	Oklahoma City .....	163
Guthrie .....	164	Oldest Rocks in Oklahoma	28
Gypsum .....	136	Opening of Oklahoma...	92
Gypsum Hills Region....	20	Origin of Arbuckle and Wichita Mts. ....	33
Gypsum Plaster .....	146	Origin of Streams .....	50
Hay .....	118	Original Owners of Okla- homa .....	83
High Plains Region....	22	Ouachita Mountains ....	9
Hogs .....	123	Ozark Mountains .....	6
Horses .....	123		
Humidity .....	64-70	Pennsylvanian Rock .....	36
Igneous Rocks .....	28	Permian Rocks .....	38
Indians, settlement of ...	86	Population .....	161
Indians, mode of life....	89	Portland Cement .....	145
Indian Territory .....	96	Potatoes .....	121
		Poteau River .....	54
Jurassic Rocks .....	39	Poultry .....	124
Judicial Department ....	110	Precipitation .....	65
Kiowa Country .....	95	Quaternary Rocks .....	41
Lakes .....	60	Railroads .....	151
Land Surveys .....	154-159	Rainfall .....	70
Lawton .....	166	Redbeds Plains Region..	19
Lead and Zinc.....	137	Religion .....	106
Legislative Department..	108	Red River .....	59
Lizards .....	81	Red River Region .....	16
Location of Oklahoma...	1	Reservations, Other ....	93
Manufacturing Plants....	147	Residual Soil .....	113
McAlester .....	165	Rivers, Navigation on...	150
Minerals in Oklahoma...	126	Salt .....	134
Mineral Springs .....	46	Salt Fork River .....	57

	Page		Page
Sand .....	140	Topographic Regions ...	6
Sandstone Hills Region..	17	Transportation .....	150
Sapulpa .....	167	Transported Soil .....	114
Shawnee .....	164	Trees .....	75
School Laws .....	102	Triassic Rocks .....	39
Schools, city .....	104	Tulsa .....	166
Schools, country .....	103	Turtles .....	81
Schools, church .....	106		
Schools, state .....	105	Underground Water ....	43
Sedimentary Rocks.....	27	Underground Water ,	
Settlement of Indians ...	86	movement of .....	44
Settlement of Oklahoma.	91-92		
Snakes .....	81	Vegetables .....	121
Springs .....	44	Verdigris River .....	54
Springs, mineral .....	46	Vinita .....	169
Soil Areas .....	112		
Soil, residual .....	113	Washita River .....	58
Soil, transported .....	114	Weather .....	63
South Canadian River...	55	Weather Bureau .....	65
State Superintendent .....	103	Weatherford .....	169
Streams, character of....	51	Wells .....	46
Streams, chief .....	50	Wells, Artesian .....	48
Streams, origin of.....	50	Wheat .....	116
Stillwater .....	169	Wichita Mountains .....	14
Stock Raising .....	122	Wild Animals .....	78
Surveys of Land .....	154-159	Wind .....	64-69
Temperature .....	63-69	Zinc .....	137
Tertiary Rocks .....	39		









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